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2 UNITED STATES DEPARTMENT OF AGRICULTURE
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Crops Research Division
2a Vegetables and Ornamentals Research Branch
Potato Investigations
Beltsville, Maryland

3 THE NATIONAL POTATO-BREEDING PROGRAM, 1960

By
Robert V. Akeley and Others,
and
State Cooperators

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(Thirty-first Annual Report to Cooperators)
Plant Industry Station
Beltsville, Maryland

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PLANT INDUSTRY STATION (Beltsville, Md.) and
CHAPMAN AND AROOSTOOK FARMS (Presque Isle, Maine)
R. V. Akeley, A. E. Schark, R. W. Buck, Jr., E. S. Schultz,
M. J. O'Brien, G. V. C. Houghland, and G. Pittarelli

Plant Industry Station

In the greenhouses at Plant Industry Station, Beltsville, Md., in 1959 over 100 parents were planted and more than 350 seed lines of various combinations were obtained. The following disease-resistant factors were involved: late and early blight; common and powdery scab, ring rot, leaf roll and net necrosis, verticillium wilt, brown rot, corky ringspot; virus X, A, Y and S; and resistance to insects and nematodes. Other factors involved were tuber-skin colors (red, white, russet, and yellow), high solids, processing characters, yield, fertility, and maturity. Approximately 45,000 seedlings from 163 families were grown from true seed to tubers in the greenhouses and distributed to cooperators (P.I. table 1).

Distribution

As usual, the distribution of potato seed, new seedlings, advance selections, and named varieties continued. A summary of the shipments is given in P. I. tables 1, 2, and 3. The true seed, new seedlings, and small lots of tubers were sent from Plant Industry Station, but many of the larger shipments were made directly from Maine.

P. I. table 1.--Distribution of potato seed and new seedlings from the greenhouse at Beltsville, Md., 1960.

Country or State	Cooperator	Number of progenies	Number Tubers	Seeds
Australia	W. Hartley	5		2,700
India	H. Koshore	11		5,900
Venezuela	A. S. Mittelhozer	14		7,800
Colorado	S. A. Alfieri, Jr.	55	10,036	
Idaho	W. C. Sparks	26	3,046	
Maine	F. Manzer	19	6,801	
Maine	J. M. McDaniel	7		1,400
Maine	A. E. Schark	183	33,411	
North Carolina	F. L. Haynes, Jr.	4	324	
Ohio	J. P. Slesman	9	2,025	
Texas	B. A. Perry	21	4,958	
Washington	W. G. Hoyman	24	4,307	
West Virginia	K. C. Westover	31	3,397	
Wisconsin	F. J. Stevenson	41	6,480	

P. I. table 2.--Distribution of named and numbered varieties to foreign countries, 1960.

Country	Cooperator	Number of varieties
Australia	H. H. Hyland	17
Belgium	V. Melard	6
British Guiana	M. E. Knickerbacher	1
Canada	H. Genereux	5
Canada	G. R. Johnston	6
Canada	A. Kozlowska	1
Germany	E. Raddatz	22
India	B. Muniyappa	10
Israel	H. H. Fisher	1
Korea	H. H. Fisher	15
Korea	K. Rhee	7
Netherlands	N. Emb	1
Netherlands	G. A. Thijn	1
Nigeria	A. J. Davis	20
Russia	Director of Plant Industry	16
South Africa	H. H. Fisher	2
Sudan	H. H. Fisher	8
Vietnam	J. Hamilton	10
Venezuela	A. Montaldo	20
West Pakistan	S. M. Umar	7

P. I. table 3.--Distribution of named and numbered varieties to States, 1960.

State	Cooperator	Number of Varieties
Alabama	J. M. Barber	7
Alaska	C. Dearborn	4
California	W. S. Barham	7
California	J. G. McLean	6
California	R. Keirstead	2
California	G. D. Davis	17
Colorado	S. A. Alfieri, Jr.	38
Colorado	C. Frutchey	3
Colorado	J. Weigle	10
Connecticut	A. Hawkins	15
Connecticut	L. V. Edgington	2
Delaware	E. P. Brasher	16
Florida	H. H. Eddins	13
Florida	E. W. McCubbin	31
Florida	J. C. Noonan	3
Georgia	J. E. Bailey	20
Hawaii	J. C. Gilbert	14
Idaho	W. M. Iritani	3
Idaho	J. F. Klimer	1
Idaho	W. R. Purcell	1
Indiana	K. W. Johnson	3
Iowa	E. T. Hibbs	1

continued

P. I. table 3, continued.

State	Cooperator	Number of varieties
Iowa	L. Sanford	9
Kansas	J. K. Greig	3
Kentucky	D. J. Colter	29
Louisiana	J. C. Miller	3
Louisiana	T. P. Dykstra	24
Maine	A. E. Schark	17
Maine	T. Sutherland	12
Maryland	A. E. Kehr	8
Maryland	R. E. Webb	314
Massachusetts	M. Weeks	20
Michigan	N. R. Thompson	3
Michigan	H. P. Watson	6
Minnesota	F. I. Lauer	7
Minnesota	O. C. Turnquist	3
Missouri	V. N. Lambeth	3
Nebraska	R. O'Keefe	3
New Jersey	J. C. Campbell	74
New Jersey	G. Morris	5
New York	D. F. Dye	20
New York	E. E. Ewing	25
New York	L. C. Peterson	95
New York	R. L. Plaisted	1
New York	R. L. Sawyer	16
New York	S. Shur	4
New York	J. Winfield	3
North Dakota	R. H. Johansen	32
North Dakota	B. Picha	10
North Dakota	E. Siggeisson	6
Ohio	D. Comin	3
Ohio	F. Lower	14
Ohio	J. P. Sleesman	10
Oregon	D. F. Dye	20
Pennsylvania	J. D. Harrington	27
Pennsylvania	W. R. Mills	4
Pennsylvania	P. Zander	3
Rhode Island	J. E. Sheehan	28
South Carolina	W. Sitterly	41
South Dakota	C. M. Nagel	7
Texas	J. M. Coruthers	23
Texas	B. A. Perry	289
Utah	V. N. Jacob	2
Virginia	F. S. Andrews	16
Virginia	M. M. Parker	16
Washington	W. G. Hoyman	9
West Virginia	H. H. Griffith	1
Wisconsin	C. E. Cunningham	14
Wisconsin	H. Darling	11
Wisconsin	R. W. Hougas	1
Wisconsin	R. H. Larson	9
Wisconsin	G. H. Rieman	3

Chapman Farm, Maine

Four named varieties and 43 seedling selections were grown for increase in 100-hill rows on the Chapman Farm in 1960. This material will be sent to cooperators for yield trials and used for evaluation tests of quality and horticultural characteristics in Maine.

A summary of the maturity and fertility data on the 10-hill rows grown on the Chapman Farm in 1960 is given in P. I. table 4. Field fertility is measured by the relative number of seedballs produced per plant. Of a total of 874 selections grown in 1960, about 71 percent were judged early or medium in maturity and 7 percent good to medium in fertility. Over 80 percent of the seedlings were unfruitful. In 1959 over 90 percent of the seedlings were unfruitful.

Approximately 32,874 seedlings representing 104 family lines previously grown in the greenhouses at Beltsville, Maryland, were planted at Chapman Farm for increase and selection. The germination of the seedling was approximately 97 percent. About 6 percent (1976 seedlings) were selected at harvest time for increase in 10-hill rows next year (P. I. table 5).

Beginning this year, the mechanics of the breeding program have been modified with respect to the handling of the selected material. Previously, all clones selected from the seedling populations were tested for disease resistance and grown in 10-hill rows the year following selection. The number of tubers from a desirable single hill is limited to between 7 and 10. A large set will result in numerous undersize tubers while a small set will produce a low yield of oversize tubers. In many cases the number and size of the tubers would limit the selection to only two or three disease tests. In any case there would seldom be enough seed for all of the 7 disease tests, a 10-hill maintenance planting, and a limited distribution. In addition, selection for horticultural type was limited to a single hill spaced 3 feet by 3 feet. Under the modified plan, the seedling clones will be grown in a 10-hill row for a second horticultural selection before being distributed or tested for disease reaction. Since a relatively large amount of seed will be available at this time, the selections will also be sent to a number of cooperators for observation. Thus, under the new procedure, the material will be fully evaluated in a shorter period of time, and less space and manpower will be expended on routine disease testing.

P. I. table 4.--Maturity and fertility of seedlings grown in 10-hill rows on Chapman Farm, 1960.

Maturity classes	Seedlings		Fertility classes ^{1/}	Seedlings	
	No.	Pct.		No.	Pct.
Early	282	32.3	None	744	81.5
Medium	341	39.0	Slight	105	11.5
Late	251	28.7	Medium	61	6.7
Very late	0	0.0	Good	3	.3
Total	874	100.0		913	100.0

^{1/} Based on the relative number of seedballs set in the field.

P. I. table 5.--Single-hill seedlings grown on Chapman Farm in 1960, showing the total number planted, grown, selected, and the number of selections segregating for each of eleven diseases.

Planted	Grown	Selected	Late Blight	Scab	Ring rot	Viruses			Leaf- roll	Vert. wilt	Golden nematode	Brown rot	Corky ringspot
						A	X	Y					
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.
32,874	31,821	1976	1489	1230	709	1620	163	379	529	852	136	17	403

Aroostook Farm, Presque Isle, Maine

The growing season in Northern Maine for 1960 began with ideal cool, dry planting weather in early May. Most of the rainfall for the entire crop year came in the months of May and June. From the middle of June to the end of the growing season, rainfall was spotty and the weather was hot and dry. As a result, yield was lower and solids content higher than normal. The average solids content this year of Irish Cobbler was 23.6; for Katahdin 22.5; and for Green Mountain 23.8 percent. Normally, the percentages would be about 19.0, 18.9 and 21.0 percent, respectively.

Approximately 72 named and 92 numbered varieties were grown for increase on the Aroostook Farm. Norland, Nordak and the recently released USDA varieties Redskin and Catoosa were among those that were increased. Also 459 varieties and selections were grown for observation, distribution, and parents in the breeding plot, and 93 varieties were grown in 20-hill rows in the variety collection. About 74 seedlings were increased for Texas.

The Texas material is being increased and maintained in Maine while samples from them are being tested for adaptation under Texas conditions. This material will be maintained and increased in the future at the USDA Field Laboratory located at Greeley, Colorado.

All experimental plots were planted between the 9th and 27th of May. The early, medium, and late maturity yield trials were planted on May 16th and 17th. Eleven hundred pounds of a 10-15-15 fertilizer were applied per acre to all plots at planting time. A weekly spray consisting of dithane and DDT was applied from June 22 to September 6. On July 13 and August 24, parathion was added to the spray mixture. Sodium arsenite was not used on the yield trials this year because of the relatively little vine growth produced under the dry weather conditions. The yield trials were rotobeat on September 13 and harvested on September 20 and 21.

Yield Tests and Quality Studies

Several generalizations apply to all three yield trials (early, medium and late maturing) this year. Yields of the selections in the three trials were about 50 percent of the yields obtained in 1959. For example, B 3309-8 was included in the early maturing trial in 1959 and in 1960. It was the second highest yielding selection in the trial both years. In 1959, B 3309-8 yielded 484 cwts. per acre, and in 1960, 275 cwts. per acre, a little more than 56 percent of the 1959 yield.

The solids content of all selections was much higher this year than in 1959. The highest solids percentage of all three trials in 1959 is lower than the lowest solids percentage in 1960. B 3556-12 had the highest solids percentage (19.4 percent) in the 1959 early-maturing yield trial. In 1960 this same selection was the second highest variety in total dry matter, containing 24.7 percent solids. The lowest percent solids in the 1960 early maturing yield trial was 20.3 percent for B 4312-21. There is almost a 1 percent difference in dry-matter content between the highest solids percentage in the early-yield trial in 1959 (19.4 percent) and the lowest solids percentage in the same trial for 1960 (20.3 percent). The corresponding figures for the medium-and late-maturing yield trials are 1.2 and 1.0 percent respectively.

The greatest yearly differences occurred in the after harvest chip color index. In 1959, the lightest chip color after harvest was 6.4. Only two selections, B 3457-2 and Avon, from all three trials were below 7.0 and could be considered acceptable in color after harvest. The lightest reading recorded in 1960 was 4.1. Both Antigo and I 1111-8 had a color index of 4.1. In the early trial, 75 percent (15 out of a total of 20) of the selections were below 7.0 in color. In the medium-maturity trial about 78 percent of the selections were below 7.0 in color. In the late-maturity trial 63 percent were below 7.0 in color.

The 38°F. and conditioned material is not comparable between the two years because of a change in technique in 1960.

In the past, the chipping material stored at 38°F. had been conditioned four to six weeks depending upon the chip color of Kennebec, a standard chipping variety. A supply of Kennebec was stored with the chipping material at 38°F. and during conditioning. A sample of Kennebec was then chipped at weekly intervals and when its chips were considered commercially acceptable, the remaining selections were chipped. This year all selections were chipped after a conditioning period of 15 days. Conditioning of potatoes for chipping is one of the major problems in commercial potato chip manufacture. Troublesome sprouting of the tubers occurs the longer the material is conditioned. Also, a short conditioning period allows more flexibility in plant operations. Potato chip demand would need to be anticipated for only two weeks instead of 30 to 40 days.

After harvest a sample from 4 replicates in each yield test was saved for quality determinations. The average specific gravity of a 10-tuber sample, from which total solids was estimated, was taken in October. One 5-tuber sample was selected to make potato chips in November. These samples were stored at 50°F. between harvest and the time of the fry tests. Six other 5-tuber samples were placed in a 38°F. storage. On January 3, 1961, one 5-tuber sample was transferred from 38°F. storage to 60°F. storage for conditioning. These samples were chipped 15 days later. The remaining 5-tuber samples held at 38°F. will be conditioned for 15 days and chipped at eight week intervals. Potato slices 1/16 inch thick were used for potato chips. They were sliced, rinsed in cold water, dried, and then fried in vegetable shortening at 350°F. until the oil ceased bubbling. A total of 10 chips, two from the center of each tuber, were made from each 5-tuber sample. Each of the 10 chips was compared with the standard color reference chart of the National Potato Chip Institute and the corresponding class number recorded. The 10 numbers were totaled and divided by 10 to obtain the sample index. The figure 1 represents a very light-colored chip and the figure 10 a very dark-colored sample. A

sample index of 7 or less is considered acceptable in color.

The data for the early yield trial are tabulated in P. I. table 6. Fourteen seedling selections and 3 varieties were compared in yielding ability, solids content, and chip color with the three check varieties, Cherokee, Irish Cobbler and Katahdin. The highest yielding entry was the variety Haig. It was also the first variety in solids content (25.4 percent). Haig produces chips of acceptable color immediately after harvest but cannot be satisfactorily conditioned after a 38°F. storage period. Haig was developed and released in Nebraska in 1957. It is midseason to early in maturity and has a creamy white skin that develops into a scaly russet at maturity. Haig is resistant to scab, virus Y and virus X. It is susceptible to late blight, ring rot, verticillium wilt, and leaf roll. Seedling B 3309-8, a red-skinned selection, was the second highest yielding entry in 1960. It was also the second highest yielding selection in the 1959 early yield test. B 4312-21 was the highest yielding selection in the 1959 test. This year the same selection ranked eleventh in yielding ability. All of the entries except the last three were satisfactory in percent of U. S. No. 1 tubers. B 3556-12 was the lowest yielding selection in 1959 and in 1960. It has been retained in the early trial because of its high solids content. Solids percentage varied from a high of 25.4 percent for Haig to a low of 20.3 percent for B 4312-21. All of the entries except B 4093-18 and B 4321-1 produced acceptably colored chips after harvest. Only two selections, B 3172-13 and F 4713 produced acceptable chips after 38°F. storage and 15 days of conditioning.

P. I. table 6. Early-maturity yield test, Aroostook Farm, Presque Isle, Maine, 1960.

Variety	U. S. No. 1 tubers per acre ^{1/}			Potato chip color ^{2/}	
	Cwt.	Pct.	Solids Pct.	After harvest	38°F. storage and conditioned
Haig	313	92	25.4	6.6	9.7
B 3309-8	275	96	20.6	6.7	9.5
Kasota	274	83	23.3	5.9	9.5
B 4093-18	269	98	20.9	8.6	10.0
Cherokee	267	95	24.5	4.7	8.9
Irish Cobbler	267	92	23.6	5.7	7.7
B 3309-4	264	91	20.7	5.9	9.6
B 605-10	253	95	23.4	6.3	9.3
F 4613	250	96	22.2	6.6	7.3
F 4713	247	95	23.1	5.0	7.0
B 4312-21	242	97	20.3	7.0	9.9
B 4128-1	241	92	22.5	5.2	10.0
96-56	240	95	22.3	7.0	9.0
Antigo	236	93	21.4	4.1	9.6
B 4321-1	231	97	22.9	7.9	10.0
Katahdin	232	95	23.5	5.2	8.8
B 4093-11	219	96	21.0	7.1	10.0
B 3626-13	170	84	23.5	4.5	9.2
B 3172-13	154	82	23.2	5.2	6.6
B 3556-12	136	75	24.7	6.5	9.9
L.S.D. 5%	33		.4		

^{1/}To convert cwt. per acre to bushels per acre multiply by 1.666.

^{2/}Color indices based on the standard color chart of the National Potato Chip Institute. The figure 1 represents a very light color and the figure 10 a very dark color.

^{3/}Material held at 38°F. from September 19, 1960 to January 3, 1961. On this date the tubers were transferred to 60°F. and then chipped 15 days later.

Fifteen medium-maturing seedlings and 6 medium-maturing named varieties were compared in yielding ability with the check varieties Kennebec and Katahdin. Yields, total solids, and chip color of these selections are presented in P. I. table 7. There were no significant differences in yield between Kennebec and the next five varieties listed in order of yield. B 4094-23 is a scab-resistant russet selection. It was the second lowest variety in solids content, and its chip color was dark both after harvest and after storage and conditioning. Onaway was third in yield and had 21.3 percent solids content. Also, it had the darkest after harvest chip color and its chip color was unsatisfactory after storage and conditioning. Number 51.1-53-12 ranked fifth in yield this year and was fourth in yielding ability in 1959. It is a red, scab-resistant selection developed by Mr. Ben Picha. Blanca is a new white variety released by the USDA and the State of Colorado. The percent of U. S. No. 1 tubers for Blanca was very low (81 percent). Under conditions of adequate rainfall this may not be a problem with Blanca. It will be in the trial again next year. I 1111-8 had 23.9 percentage of total solids. This was the highest solids content in the test.

P. I. table 7. Medium-maturity yield test, Aroostook Farm, Presque Isle, Maine, 1960.

Variety	U. S. No. 1 tubers per acre ^{1/}			Potato chip color ^{2/}	
	Solids			After harvest	38°F. storage ^{3/} and conditioned
	Cwt.	Pct.	Pct.		
Kennebec	267	96	21.6	4.6	6.4
B 4094-23	265	95	19.5	7.1	10.0
Onaway	251	96	21.3	9.6	9.4
Katahdin	250	94	23.0	4.5	9.3
51.1-53-12	249	93	20.9	6.9	9.5
Blanca	246	81	22.7	6.4	9.2
Norgleam	239	95	20.7	7.1	10.0
B 3353-9	236	93	21.5	5.4	9.5
I 1111-8	231	94	23.9	4.1	9.1
Norland	231	93	20.6	5.6	8.6
I 1037-1	230	89	22.0	5.1	9.7
B 4321-23	229	85	22.0	7.1	10.0
B 3872-6	229	96	22.4	5.2	9.8
I 1107-3	227	95	23.0	5.0	9.9
I 1157-2	222	88	22.2	5.5	9.9
Nordak	222	94	21.3	6.2	10.0
Navajo	219	89	23.0	5.0	9.0
WY 1122	205	93	20.8	5.5	8.4
B 3692-4	199	85	21.2	5.2	7.4
B 4094-21	191	85	19.4	6.2	10.0
F 4631	176	92	21.5	6.6	9.3
B 4294-5	166	74	21.8	7.1	10.0
B 3457-2	153	70	23.6	5.1	8.7
L.S.D. .05%	26		1.7		

1/, 2/, 3/. See footnotes 1, 2 and 3 P. I. table 6.

In P. I. table 8, 12 late-maturing seedling selections and 5 late maturing varieties are compared in yield, total solids and chip color with the check varieties Green Mountain and Katahdin. Number B 3424-11 was the highest yielding entry in the test. Its solids content, percent of U. S. No. 1 tubers, and after harvest chip color were all satisfactory. Number B 3424-11 is a white-skinned seedling resistant to scab, late blight and ring rot. It is susceptible to verticillium wilt, leaf roll, virus X, and virus Y. In 1959, B 3424-11 ranked tenth in yield. Number B 3599-8 was the second highest yielding selection in this year's trial. This seedling variety has white skin and is resistant to late blight, scab, and virus Y. It is susceptible to ring rot. Number B 3599-8 had the lowest percentage of solids (19.9 percent) in the 1960 yield test. Redburt was fourth in yield this year and sixth in yield last year. It is a red-skinned selection that closely resembles the LaSoda variety in morphological characters. Thirteen of the 19 varieties in the test produced light-colored chips after harvest. This is in contrast to last year's test in which only one, Avon, of the 29 entries produced acceptable chips after harvest or after storage and conditioning. Redburt was in the yield test both years. In 1959 the after harvest chip color of this variety was 9.8; in 1960, 6.9.

P. I. table 8. Late-maturity variety yield trial, Aroostook Farm, Presque Isle, Maine, 1960.

Variety	U. S. No. 1 tubers per acre ^{1/}			Potato chip color ^{2/}	
	Solids			After harvest	38°F. storage ^{3/} and conditioned
	Cwt.	Pct.	Pct.		
B 3424-11	344	98	23.1	7.0	9.6
B 3599-8	343	97	19.9	7.6	10.0
Green Mountain	339	94	23.8	8.0	9.8
Redburt	314	95	21.9	6.9	8.6
B 3677-1	307	96	21.5	9.6	10.0
Saco	302	95	24.7	5.4	9.4
B 3725-1	296	86	21.0	6.8	10.0
B 3401-25	292	97	20.2	9.7	10.0
B 4083-3	287	97	21.5	6.1	10.0
B 4085-6	284	95	21.4	5.9	10.0
Delus	281	98	25.0	4.5	8.5
Knik	279	94	21.7	8.0	9.8
Excel	278	95	23.8	7.1	9.9
B 4613-3	273	92	20.6	6.7	9.4
B 3602-4	271	92	22.3	6.6	10.0
I 8140-1	262	94	23.2	4.5	7.9
B 4312-4	262	96	20.3	6.4	10.0
Katahdin	250	95	22.5	4.8	9.1
B 751-119	242	95	23.9	4.7	7.8
L.S.D. .05%	38		1.4		

^{1/}, ^{2/}, ^{3/}. See footnotes P. I. table 6.

Scab Resistance

For the past few years the incidence of scab, as measured by the type and number of pustules on Green Mountain tubers, has been decreasing on the field used for the scab trials. This year a different area on Aroostook Farm was selected for the scab test. The past history of this field has indicated a high incidence of scab. A comparison of the pustule type and surface area of the Green Mountain checks for this year and last year reveals that the new area does produce considerably more scab on tubers of Green Mountain than the old plot. In 1959, 0.1 percent of the Green Mountain tubers had 61 to 80 percent of the tuber area covered with some type of scab. In 1960, the figure was 22 percent. The number of large rough pustules increased from 1 percent in 1959 to over 90 percent in 1960. The results from this year's scab test are tabulated in P. I. table 9. Two of the seedling selections tested, B 3726-6 and B 4093-18, were completely free of scab.

P. I. table 9. Summary of the data observed from the scab tests on Aroostook Farm, Presque Isle, Maine, 1960.

Material tested	Total hills	Scab free	Surface area covered ^{1/}					Pustule type ^{2/}			
			T	1	2	3	4	1	2	3	4
22 named varieties	44	0	8	24	6	4	2	4	4	14	22
Seedling selections	646	2	46	87	90	74	26	39	69	98	117
Green Mountain checks	690	0	2	2	52	480	154	0	2	58	630

^{1/}Surface area covered: T, less than 1%; 1, 1 to 20%; 2, 21 to 40%; 3, 41 to 60%; 4, 61 to 80%.

^{2/}Type of pustule: 1, small, superficial, 2, large, but still superficial; 3, large rough pustules; 4, large rough pustules, deeply pitted.

Verticillium Wilt Resistance in Variety and Seedling Tests

A. E. Schark, R. V. Akeley, and F. E. Manzer

In 1959, and again this year, all of the material tested for verticillium wilt resistance was freshly cut and dipped in a slurry of the verticillium wilt organism immediately before planting. Cherokee, Katahdin, and Houma were planted at intervals of 25 rows throughout the field test. Cherokee is considered susceptible, Katahdin intermediate, and Houma resistant to wilt.

About 171 commercial varieties, or seedling selections from the breeding plot, were tested for wilt resistance in 5-hill rows. Many of these selections have been used as parental material to introduce a source of one or more superior disease or culinary qualities into a cross. Twelve of the selections tested remained free of wilt symptoms. These twelve included Variety 43, B 751-119, X 792-76, X 792-88, X 792-94, and B 3922-1. The X 792 series is one of the most wilt resistant group of clones known and has shown a high degree of resistance in the tests for a number of years.

Last year a group of seven segregating populations were tested for wilt resistance in 5-hill plots. Within each population the number of segregates varied from 77 to 99 (see P. I. table 11, page 10, The National Potato Breeding Program Report, 1959). At harvest time a single large tuber was saved from each hill of the segregates that remained free of wilt symptoms in the 1959 test. These tubers were cut into four seedpieces and comprise the "selections tested" under segregating populations in P. I. table 10. Only a few of these selections remained free of wilt symptoms in 1960. The pedigree B 4616 appears to be the most resistant population. Almost twenty percent of the selections from this population replanted in 1960 remained free of wilt symptoms. The hills of four of the pedigrees, B 4509, B 4613, B 1544, and B 1545, were 100 percent infected with wilt. A possible explanation for the large number of escapes in the 1959 test could be the weather conditions at the time of planting. In 1959 it was hot and dry at the time the seed was planted. Conditions at this time were so adverse that a special note was made on the planting plans. The furrows were opened just before the seed was planted. However, the furrows dried out shortly after planting began, and the soil used to cover the seed was dry. In 1960 weather conditions were more favorable for planting the disease test. This study will be continued in 1961. A single large tuber from a hill of each segregate was harvested in the fall of 1960 for replanting in 1961.

Forty-four named varieties or seedling selections were tested for wilt resistance in 20-hill plots. Freshly cut seed pieces were dipped in a slurry of Verticillium albo-atrum and planted at 10-inch intervals. None of the varieties or selections has all 20 hills free of wilt symptoms.

P. I. table 10. Reaction to verticillium wilt of inoculated seedling selections, commercial varieties, segregating potato seedling populations, and three check varieties grown in wilt-infested soil on Aroostook Farm, Presque Isle, Maine, 1960^{1/}

Material tested	Selections tested		No.	Pct.	Selections infected		Readings based on total hills		Pct.
	No.				No.		Total	Infected	
Commercial varieties and seedling selections	171	159		93		738	519	70	
Katahdin check	20	17		85		88	55	63	
Houma check	20	19		95		88	58	66	
Cherokee check	20	20		100		88	80	91	
Segregating populations ^{1/}									
	Pedigree		Parentage						
B 4446	B 595-76 x Katahdin		50	49		199	163	82	
B 4509	B 3707-4 x Earlane		9	9		36	36	100	
B 4589	Katahdin x B 1383-5		35	34		140	117	84	
B 4613	B 3309-8 x Katahdin		19	19		76	67	88	
B 4616	B 3139-24 x Katahdin		64	51		256	147	57	
B 1544	Earlane selfed		11	11		44	39	89	
B 1545	Katahdin selfed		41	41		164	134	82	

^{1/} Segregating population seed was from segregates with zero readings for verticillium wilt grown in 1959. See text for further explanation. P. I. table 11, page 10, of the National Potato Breeding Program Report for 1959 lists the total number of selections tested in each segregating population.

Varietal Reaction to Net Necrosis and Stem-end Browning

Twenty-one named varieties and 24 seedling selections were tested for resistance to net necrosis as measured by percent of infected tubers. In the past the material has been planted in isolation, and viruliferous aphids placed on each plant early in July. This year the test was planted next to the seedling clones that were being tested for leaf roll resistance. Infection of the plants was by natural spread from the inoculated seedling material. Considerable current-season leaf roll symptoms were observed in the plants during the growing season. The tubers were stored at 50°F. from harvest time until they were cut and examined (January 4, 1961). The tubers of all but three of the 45 selections and varieties tested were free from net necrosis. The percent of the tubers showing net necrosis for the 3 selections was as follows: Nordak, 67 percent; Norgleam, 51 percent; B 3114-67, 13 percent. No stem-end browning symptoms were observed in any of the selections in 1960 (P. I. table 11).

P. I. table 11. Varietal and seedling reaction to net necrosis in the field, Aroostook Farm, Presque Isle, Maine, 1960.

Variety	Tubers exam.	Net nec.	Variety	Tubers exam.	Net nec.	Variety	Tubers exam.	Net nec.
	No.	Pct.		No.	Pct.		No.	Pct.
Huron	53	0	Knik	50	0	B 3457-2	22	0
Onaway	66	0	Nordak	52	67	B 3599-11	73	0
Red Beauty	56	0	Norgleam	59	51	B 3604-1	71	0
Rushmore	46	0	Norkota	59	0	B 3641-15	40	0
Tawa	27	0	Norland	60	0	B 3725-1	66	0
B 605-10	62	0	Osage	51	0	Fundy	36	0
B 926-9	30	0	Redbake	51	0	I 1037-1	61	0
X 1276-185	66	0	Redburt	50	0	I 1107-3	54	0
B 2187-25	86	0	Var. 43	43	0	La 4112	28	0
B 3299-13	60	0	B 579-3	59	0	B 4312-21	20	0
Excel	64	0	B 2171-14	50	0	Early Gem	57	0
Haig	93	0	B 3114-67	38	13	B 2894-24	52	0
Huinkul	56	0	B 3309-4	53	0	B 3626-13	102	0
Catoosa	91	0	B 3309-8	44	0	B 3692-4	50	0
Kasota	58	0	B 3353-9	67	0	B 4094-21	38	0

Golden Nematode Resistance

R. V. Akeley, L. C. Peterson and A. E. Schark

The results of the 1960 tests for golden nematode resistance are given in P. I. table 13. The procedure for evaluating the resistance to nematodes was the same as that used in previous years. Considerable progress has been made in transferring nematode resistance from species to tetraploid selections by the backcross method. Over 90 clones have been selected for further evaluation from the many resistant seedlings tested. Three or four may be considered for release as golden nematode resistant varieties.

P. I. table 12. Golden nematode-resistance tests. Selections made in Maine, 1959 and tested on Long Island, N. Y. in 1960^{1/}

Pedigree number	Parentage	Maine, 1959	Tested N. Y., 1960	
		Selected	Susceptible	Resistant
		No.	No.	No.
B 4762	Mohawk x B 3944-29	2	2	0
B 4824	B 2368-4 x B 3944-29	15	8	7
B 4839	B 3944-29 x B 3950-1	10	7	3
B 4842	B 4087-5 x B 4159-2	1	1	0
B 4844	B 4146-4 x Cherokee	17	8	9
B 4845	B 4146-4 x B 2368-4	4	2	2
B 4846	B 4159-8 x Yampa	13	9	4
B 4847	B 4159-8 x Kennebec	2	2	0
B 4850	X 1276-185 x B 3944-29	33	18	15
B 4861	Ac 25976 x B 3944-29	3	1	2
Totals		100	58	42

^{1/} Tests were made by L. C. Peterson and co-workers on Long Island, N. Y.

Late Blight Injury as Reflected in Yield and Percentage of Solids

Three highly resistant varieties, Kennebec, Merrimack, and Saco, and 2 moderately resistant varieties, Sebago and Menominee, were compared in yielding ability with the susceptible variety Katahdin. The field plot was sprayed at 7-day intervals with the treatments given in P. I. table 14. Each treatment was separated from the adjacent one by planting 2 rows of the susceptible variety Teton. On July 14 the Teton guard rows were inoculated with the "O" race of late blight grown on potted Green Mountain plants and then transferred to the field. One plant was placed in each guard row. Climatic conditions were unfavorable for the spread of late blight in 1960. From the middle of July until harvest time the weather was hot and dry. Normally the inoculated Teton rows are completely dead by August 20 or 30. This year many plants of the Teton rows survived until harvest time. The highest percentage infection observed this year on any of the 4 treatments, or the inoculated Teton rows, was between 76 and 88 percent. During the years when late blight reaches epiphytotic proportions there is a sharp upward turn in the yield of all varieties from the water treatment to the Dithane sprays. For example, in 1959, when late blight spread was very great, the susceptible variety Katahdin yielded 205 cwt. under the water treatment and 299 cwt. under the Dithane treatment, an increase of 94 cwt. For Kennebec, a resistant variety, the increase was less--from 351 cwt. under the water treatment to 386 cwt. under the Dithane treatment. This is an increase of 35 cwt. or about one-half of the Katahdin increase. In 1960 the comparable yield increases for Katahdin and Kennebec were 21 cwt. and 8 cwt. These results indicate that a spray program is needed under conditions unfavorable for the spread of late blight. With the exception of Menominee under the Dithane plus DDT treatment, the water spray had the lowest yield of the 4 treatments. With the exception just noted, DDT or Dithane alone, or in combination increased yield in all cases.

P. I. table 13. Reaction of 6 varieties to late blight as reflected in yields and percentage solids^{1/} of 4 spray treatments, Aroostook Farm, Presque Isle, Maine, 1960.

	^{2/} Treatments, yield				^{3/} and percentage solids					
	Water		DDT		Dithane		DDT + Dithane		Means	
	Total yield	Total solids	Total yield	Total solids	Total yield	Total solids	Total yield	Total solids	Total yield	Total solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Menominee	269	22.7	277	22.1	291	23.0	249	23.4	272	22.8
Sebago	236	23.6	269	22.3	246	22.6	240	23.2	248	22.9
Saco	231	26.2	259	25.7	266	25.3	251	25.5	252	25.7
Kennebec	231	25.0	268	24.5	239	24.8	252	24.3	247	24.6
Merrimack	221	25.6	225	25.0	223	25.1	237	24.3	227	25.0
Katahdin	216	23.4	227	22.2	237	24.2	224	23.2	226	23.3
Means	234	24.4	254	23.6	250	24.2	243	24.0		

^{1/} Based on specific gravity of tubers.

^{2/} L.S.D. .05 level between any 2 varieties 16 cwt.

" " " " " " treatments 12 cwt.

^{3/} L.S.D. .05 level between any 2 varieties .6 percent.

" .05 " " " " treatments .5 percent.

Effect of spray treatments on Total Yield, Percentage Solids, and Chip Color of Six Potato Varieties

Six varieties, Early Gem, Katahdin, Kennebec, Menominee, Saco, and Merrimack, were planted on Aroostook Farm in the same design as used for the late blight injury test. The data for this test are tabulated in P. I. table 14. The Teton buffer rows were inoculated at the same time and the spray treatments were applied on the same date as the late blight test. Four treatments were used: a water spray for control, a DDT plus Dithane spray, and a DDT plus Bordeaux spray. The fourth treatment consisted of DDT plus Dithane applied until August 1 and DDT plus Bordeaux from that time until the trial was harvested on September 16. The Bordeaux spray used was a 10-5-100 mixture made with finely powdered copper sulphate. Total yield was measured in the field with a portable scale. At the time of harvest a 10-tuber sample was saved for specific gravity and chipping samples. These samples were stored at 50°F. until the determinations were made in November. Results were inconclusive due to the low level of late blight infection in 1960. There was a considerable difference between varieties in yield, total solids and chip color. Kennebec had the lightest average chip color (5.7) and Early Gem the darkest (7.8). All of the treatments increased yield when compared to the water spray. No positive trend could be noted in the effect of the treatments on total solids or chip color. In all cases total yield and total solids were lower and chip color was lighter in the Dithane plus DDT treatment as compared to the Bordeaux plus DDT treatment. This comparison was not as noticeable between the Dithane plus DDT treatment and the Dithane-Bordeaux treatment.

P. I. table 14. Effect of 4 treatments on total yield, percentage total solids^{1/} and chip color of 6 potato varieties, Aroostook Farm, Presque Isle, Maine, 1960.

Treatments, total yield ^{2/} , percentage solids ^{3/} , and chip color ^{4/}																	
Water				Dithane + DDT				Bordeaux + DDT				Dithane-Bordeaux				Means	
Total yield	Total solids	Chip color	Total yield	Total solids	Chip color	Total yield	Total solids	Chip color	Total yield	Total solids	Chip color	Total yield	Total solids	Total yield	Total solids		
Cwt.	Pct.		Cwt.	Pct.		Cwt.	Pct.		Cwt.	Pct.		Cwt.	Pct.	Cwt.	Pct.		
Saco	235	25.5	6.4	274	25.5	6.3	245	24.8	6.2	280	25.4	6.8	259	25.3	6.4		
Kennebec	272	24.5	5.3	267	24.4	5.5	236	22.7	6.4	250	23.6	5.7	256	23.8	5.7		
Menominee	237	21.5	7.9	264	22.1	7.7	231	21.4	7.5	292	21.9	7.2	256	21.7	7.6		
Early Gem	202	17.3	8.2	247	20.2	8.2	235	19.4	8.0	252	19.8	7.0	234	19.2	7.8		
Katahdin	203	22.2	7.3	237	22.5	7.1	215	21.6	7.4	229	22.9	6.5	221	22.3	7.1		
Merrimack	231	25.3	7.0	228	24.4	6.6	196	24.2	5.8	210	25.4	6.5	216	24.8	6.5		
Means	230	22.7	7.0	253	23.2	6.9	226	22.3	6.9	252	23.2	6.6					

1/ Based on specific gravity of tubers

2/ L.S.D. .05 level between any 2 variety means 19 cwt.

" " " " 2 treatment means 15 cwt.

3/ L.S.D. .05 " " " 2 variety means .5 percent.

" " " " 2 treatment means .2 percent.

" " " " 2 variety means for the same treatment 1.6 percent.

" " " " 2 treatment means for the same variety 1.5 percent.

4/ L.S.D. .05 level between any 2 variety means .6 units.

Solanum Species and Hybrids
R. W. Buck, Jr.

During 1960 several clones of 38 diploid species and 6 tetraploid species were grown at Beltsville for cytological and corssability investigations. Several clones of 36 triploid hybrids were grown for cytological investigations.

Five hundred seventy combinations were attempted among diploid species and seed was obtained from 172. Of the 15 combinations attempted among tetraploid species 7 produced seed. Pollinations were also attempted among several clones of four tetraploid and 19 diploid species. Of the 272 combinations attempted 125 produced seed.

F₂ and backcross seed was also obtained from diploid and tetraploid hybrids for future investigations.

Industrial Potato Program
G. V. C. Houghland, R. V. Akeley, and A. E. Kehr

In this country, potatoes used for industrial purposes consist of culls and surplus potatoes originating from the table-stock crop. As developments continue to take place in potato processing, the supply of potatoes for industrial purposes tends to decrease. The development of a process for making dehydrated potato flakes, which originated at the Eastern Utilization Research Branch, U. S. Department of Agriculture, Philadelphia, Pennsylvania, is a big factor in this trend. At the same time research and development in the manufacturing processes for potato starch and flour are advancing and the demand for these products is increasing.

Specifications for an industrial potato, from the industry viewpoint, would include high starch and dry matter and good keeping quality. From the grower's standpoint it should produce high yields of starch per acre under intensive cultural practices, mature medium late, and possess resistance to late blight and other major potato diseases. A project planned to produce an industrial potato was initiated in 1959 at Beltsville, Md. This project has been designed to attack the problem from four avenues of approach: breeding, selection by seed germination in sucrose, selection by chemical analysis, and field selection for maximum radiant absorption.

High starch and dry matter lines are being grown in the greenhouse and selfed wherever possible and otherwise sib crossed or crossed with other high-starch receptive parents. The objectives are to get a more uniform production of starch and dry matter, and increase these factors to the highest level possible for potatoes.

Sucrose germination of seed has been used in Germany with reported success on barley, wheat, beans, buckwheat, and tomatoes to segregate lines possessing enhanced resistance to drouth, cold, and salinity. Fryxell has suggested its broad application to segregating material, which prompted its use in the present program. The seed is divided into two lots; one lot is germinated in solutions of sucrose ranging from 2 to 10 percent and the other in water. The seedling plants are grown in the greenhouse to produce tubers and these are later planted in the field where tuber selections are made from each hill.

These hill selections are analyzed for starch by a hydrolysis-polariscopic method and dry matter is determined by loss of weight after drying. So far the average differences in percent of starch obtained between treated and untreated seed have been small and in only one case has statistical significance been reached: $0.5 \pm .707$; 1.2 ± 3.818 ; $1.5 \pm .467$ (sig. 1%); $0.83 \pm .467$; 1.4 ± 2.97 ; and $0.082 \pm .91$. If the sucrose treatment is effective these differences should increase, and probably become significant, as breeding and selection continues.

Potatoes produce more energy food per unit of soil area occupied than any other vegetable crop. Most of this energy is derived from the sun. Therefore, the morphology of the potato plant must be highly important in respect to radiant energy absorbed and energy food produced. F. W. Went brings out the fact that when leaves are packed too closely or held at too small an angle the efficiency of light utilization drops sharply. This effect of leaf angle must have an important bearing on the production of potato varieties under intensive cultural methods. Houghland and Akeley have shown that the varieties Saco, Kennebec, and Katahdin, all with more or less upright type of vine growth, were better adapted to intensive culture than Merrimack. The leaves of Merrimack are held more perpendicular to the source of light, thus causing shading of the lower leaves. Went also points out that leaf corrugation and leaf hairs tend to increase light utilization by plants.

It would seem that the ideal potato plant for maximum radiant utilization should be one having upright vine growth with the leaves held at an acute angle, with abundant leaf pubescence, and corrugated leaf surface. Field selections of such plant types will be made. These will be harvested separately and their tubers analyzed for starch and dry matter. These types will be maintained as separate breeding lines and increased for testing under intensive culture as outlined by Houghland and Akeley.

In 1941 and 1942 Akeley and Stevenson compared the starch-producing abilities of 16 high starch-producing European varieties, when grown in this country, with 13 American varieties. Green Mountain produced more starch per acre than any variety in the trial. Today we have one or more new varieties that surpass Green Mountain in percent of stand and significantly outyield this older variety. These are being used to advantage in the program designed to produce an outstanding industrial potato.

Potato Disease Investigations

E. S. Schultz, Muriel O'Brien, Allen Schark, R. V. Akeley, R. W. Buck, Jr.

Late Blight Resistance--Thirty-four named varieties and 349 seedling selections were screened for resistance to late blight in the greenhouse and in the field. The "O" race was used to inoculate the plants both in the greenhouse and in the field. Susceptible Green Mountain plants were interplanted in the field plot. P. I. table 15 summarizes the results of the field test. Of the 349 seedling varieties tested, 160, or about 46 percent, were resistant; and 130, or 37 percent, were completely susceptible. Fundy, Avon, Tawa and Catoosa were the 4 named varieties that were resistant.

Resistance to virus X in 1960--About 371 seedling selections or named varieties were screened for resistance to a virulent strain of virus X. Eighty-three of the selections were highly resistant to mechanical inoculation with the virus. The varieties Tawa and Variety 43 were among the resistant selections. The method of testing for virus X resistance was the same as that used in previous years. Briefly, the method consists of recording visual symptoms of virus X expressed in potato plants mechanically inoculated with a virulent strain of X and the reaction on the indicator plant, Gomphrena globosa, when sub-inoculations are made from clones not showing necrosis.

P. I. table 15. Field resistance to late blight of 349 seedling selections and 34 named varieties inoculated in the field with the "O" race, Aroostook Farm, 1960.

		Relative resistance 14 days after infection in the field					
	Total tested No.	Selection ratings ^{1/}					
		1 No.	2 No.	3 No.	4 No.	5 No.	6 No.
Seedling varieties	349	160	5	2	10	42	130
Named varieties	32	4	0	0	2	3	23

^{1/} Selection rating: 1, no lesions - resistant; 2, occasional lesion; 3, 1/2 of leaves affected; 4, 2/3 of leaves showing lesions; 5, all but a few leaves showing lesions; 6, plants dead.

Virus Y resistance--Approximately 327 seedling selections or named varieties were included in the Y test for 1960 in Maine. Eighty of the 327 selections tested did not develop current-season symptoms of infection, Haig, Huinkel, Norkota, and Osage were among the resistant selections. All of the material was inoculated with viruliferous Myzus persicae in the field shortly after the plants emerged. Readings were taken 7 weeks after inoculation.

Disease tests at Beltsville, Maryland--About 245 new seedling selections were tested for resistance to late blight, virus A, and virus X in the greenhouse at Beltsville, Maryland. The results of these tests will be printed in the 1961 report.

NORTH CENTRAL REGIONAL COOPERATIVE TRIALS 1960

August E. Kehr and Cooperators^{1/}

This completes the tenth year for the North Central Trials in their present form. These trials have been valuable for evaluation of advanced breeding lines over a varied set of environmental conditions, planting dates, soils, and cultural practices. Such trials assist the originator in making wise decisions regarding ultimate release because he receives unbiased assessment of the potential of his entry from ten sources. These trials also afford all participants an opportunity to become familiar with advanced breeding lines long before they are released as varieties.

One selection from the 1959 trials has been named and released as follows:

<u>Progeny No.</u>	<u>Release Name</u>	<u>Introduced by</u>	<u>Parents</u>
B 2368-4	Redskin	U.S.D.A. and Texas	Pontiac x B 400-1

Environmental Conditions: The tests were conducted on peat soils in Indiana and Iowa. Upland soils at the other locations ranged from alluvial clay to sandy silt. Fertilizer applications, spray programs, and planting distances are based upon local conditions, practices, and soil requirements.

Planting date varied from February 9 in Louisiana to June 15 in Nebraska. The total days to harvest varied from 103 days in Kansas to 139 days in Indiana, Iowa and Michigan.

	<u>Date Planted</u>	<u>Date Harvested</u>	<u>Total Days to Harvest</u>
Indiana	May 14	September 30	139
Iowa	April 28	September 14	139
Kansas	April 7	July 20	103.
Louisiana	February 9	May 31	113
Michigan	May 12	September 27	138
Minnesota	June 3	October 4	123
Missouri	April 4	August 2	120
Nebraska	June 15	October 11	118
North Dakota	May 20	September 27	130
Ohio	May 17	September 14	120
Wisconsin	May 31	October 1	123

^{1/} Indiana, K. W. Johnson; Iowa, Lind Sanford - J. C. Horton; Kansas, J. K. Greig; Louisiana, J. C. Miller; Michigan, N. R. Thompson; Minnesota, O. C. Turnquist; Missouri, V. N. Lambeth; Nebraska, Robert O'Keefe; North Dakota, R. H. Johanson; Ohio, Ralph M. Davis; Wisconsin, G. H. Rieman; USDA, A. E. Schark.

Rainfall was adequate in Indiana and Ohio. Rainfall was adequate early in the season but lacking late in the season in Iowa, Michigan, Nebraska, North Dakota, and Wisconsin. Louisiana had an unusually dry season. Irrigation was given once or more times in Kansas, Louisiana, Michigan, Missouri, and Nebraska.

With the exception of Indiana, Michigan, Ohio, and Louisiana temperatures were unfavorable for at least part of the season. Unusually hot conditions occurred in Iowa, North Dakota, Nebraska, and Minnesota.

Yields - Early Group: No entry in the early group produced average yields higher than the Triumph check, though there were individual lines which surpassed Triumph in tests in Kansas, Minnesota, Missouri, Nebraska, North Dakota, and Ohio. Three early varieties slightly outyielded the Cobbler check: Wis Ag 58, B 2894-24, and Wis Ag 29. This is the first time in several years that any entry surpassed the average yield for Cobbler. We are either breeding higher yielding early varieties or Cobbler had a bad year in 1960.

Yields - Late Group: As in the past no entry surpassed the average yield for Red Pontiac. High yielding late to medium lines were La 42-45 and ND 3815-1.

Maturity: Only Wis Ag 59 was ranked earlier than Cobbler, while most of the earlies were nearer Triumph maturity. All of the entries in the late trial matured before the Pontiac check.

Total Solids: Highest solids were found in B 3696-13, Neb 302.50-5, and Neb 201.55-3, all of which surpassed Cobbler in the percent of total solids.

As in the past 5 years location had greater effect on total solids than did variety. In those locations where solids are normally high, less selection needs to be made for this character than in locations where solids tend to be low. This is because almost any variety will have acceptable solids in such favored areas.

There are other factors which affect total solids. It is probable that the effects of planting dates, harvesting dates, fertilizers, soils, insect and fungus control measures, vine killing, and other cultural practices are confounded in the location effect. Interesting to note is that solids are consistently lower at the two locations where the trials are conducted on peat soils.

Scab Reactions: Only four selections had no scab lesions more severe than type 2: B 2894-24, ND 3815-1, ND 3740-11, and B 3692-4. Of these ND 3740-11 had by far the least incidence of scab (0.8%), followed by Catoosa (2.1%), Wis Ag 29 (4.3%), ND 4122-2 (5.1%), and Wis Ag 58 (8.4%). All entries (except one) had less incidence of scab than any of the three check varieties used. It would appear that much progress is being made in breeding for resistance to scab.

Very low overall incidence of scab was found in Kansas, Louisiana, Michigan, Missouri, and Wisconsin.

Internal and External Defects: Characters with possible weakness are starred to call them to attention. These may or may not prove to be weaknesses serious in more than one season.

Overall Merit Rating: Merit ratings given entries in 1959 and 1960 are as follows:

	<u>1960</u>	<u>1959</u>
La 42-45	24	10
Wis Ag 59	23	27
Neb 201.55-3	17	not entered
ND 3815-1	16	not entered
Neb 302.50-5	12	not entered
Wis Ag 29	10	22
ND 4122-2	8	14
B 3692-4	7	not entered
I 1426-1	7	not entered

North Central table 1. Yields of U. S. No. 1

	Ind.	Iowa	Kans.	La.	Mich.	Minn.	Mo.	Nebr.	N. D.	Ohio	Wisc.	Ave.	Yield
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Rank
<u>Early</u>													
I 1426-1	276	196	196	133	240	533	264	173	173	129	235	232	19
ND 4122-2	293	272	213	132	349	472	337	149	193	212	247	261	15
Wis Ag 29	544	281	234	143	316	467	308	144	231	149	248	279	13
Wis Ag 58	341	303	256	173	346	521	316	220	219	167	236	281	11
Wis Ag 59	269	299	230	171	337	515	309	60	180	188	266	257	16-17
B 2894-24	420	266	168	141	484	456	159	247	182	262	301	280	12
Triumph	596	346	226	183	386	529	318	139	204	213	319	315	5
Cobbler	511	319	249	163	267	344	312	210	228	165	212	271	14
<u>Medium to Late</u>													
Catoosa	-	351	200	142	490	475	322	273	197	298	333	308	6
La 42-45	630	356	258	236	417	643	329	295	194	-	325	368	2
La 91-78	452	344	220	133	327	446	332	221	187	-	268	293	9
Neb 38.49-6	536	173	244	163	443	375	264	262	188	259	304	292	10
Neb 201.55-3	636	348	220	194	321	534	230	271	227	279	253	319	4
Neb 302.50-5	499	297	210	158	330	546	237	250	176	235	296	294	8
ND 3815-1	688	236	250	230	358	666	420	-	225	248	234	356	3
ND 3740-11	579	322	250	128	362	493	434	89	222	232	277	308	7
B 3692-4	331	278	108	118	403	382	238	125	197	191	273	240	18
B 3696-13	488	251	236	120	248	442	269	216	218	97	241	257	16-17
Red Pontiac	827	441	286	143	559	695	478	264	231	412	325	424	1

North Central table 2. Maturity Classification^{1/}

	<u>Ind.</u>	<u>Kans.</u>	<u>La.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>N. D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Ave.</u>
<u>Early</u>										
I 1426-1	2.5	3.5	4.0	2.9	1.0	2.8	2.3	2.0	2.7	2.6
ND 4122-2	2.0	2.5	3.0	2.4	2.0	2.5	2.8	2.6	1.8	2.4
Wis Ag 29	2.0	3.0	2.5	2.9	3.0	2.4	2.8	2.2	2.0	2.5
Wis Ag 58	3.0	2.5	3.0	2.0	3.0	2.3	2.3	2.1	1.8	2.4
Wis Ag 59	2.0	1.7	2.5	2.3	3.0	2.3	1.8	2.1	1.9	2.2
B 2894-24	3.0	4.0	2.5	2.8	5.0	2.8	2.8	4.9	3.1	3.4
Triumph	5.0	2.2	4.0	2.3	1.0	2.0	2.0	3.0	2.3	2.6
Cobbler	2.5	3.0	3.5	2.5	1.0	2.5	2.0	2.1	1.5	2.3
<u>Medium to Late</u>										
Catoosa	3.0	5.0	3.5	3.6	2.0	3.2	3.3	4.8	4.4	3.6
La 42-45	3.0	4.0	2.5	3.3	1.0	3.2	2.8	-	2.5	2.8
La 91-78	4.0	4.5	3.5	3.0	1.0	3.2	3.0	-	2.5	3.1
Neb 38.49-6	4.0	4.2	3.0	3.4	4.0	3.3	3.0	4.0	3.7	3.6
Neb 201.55-3	2.5	4.0	3.0	3.8	4.0	2.8	2.8	4.1	1.5	3.2
Neb 302.50-5	3.0	3.0	3.5	3.6	4.0	3.0	2.8	3.0	2.4	3.1
ND 3815-1	2.5	4.0	3.0	3.1	2.0	2.8	2.8	3.0	2.1	2.8
ND 3740-11	3.0	3.9	4.0	3.9	2.0	2.8	2.8	3.0	2.1	3.1
B 3692-4	3.0	5.0	3.5	3.7	5.0	2.6	2.5	3.0	2.5	3.4
B 3696-13	2.0	4.5	3.5	4.0	5.0	3.0	2.8	2.3	3.0	3.3
Red Pontiac	5.0	5.0	3.5	3.9	2.0	3.6	3.0	4.9	4.0	3.9

^{1/} Maturity ratings as follows:

- 1 = very early - Warba or Early Gem maturity
- 2 = early - Cobbler or Norland maturity
- 3 = medium - Chippewa or Cherokee maturity
- 4 = late - Katahdin or Kennebec maturity
- 5 = very late - Pontiac or Sebago maturity

North Central table 3. Total Solids^{1/}

	<u>Ind.</u>	<u>Iowa</u>	<u>Kans.</u>	<u>La.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>Neb.</u>	<u>N. D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Variety Ave.</u>
<u>Early</u>												
I 1426-1	15.6	15.2	17.5	18.6	17.3	17.1	19.9	20.1	20.7	19.0	18.4	18.1
ND 4122-2	14.8	16.7	16.7	18.6	17.5	17.1	18.6	20.3	20.9	19.7	18.2	18.1
Wis Ag 29	16.9	15.2	17.7	18.2	17.5	17.1	18.8	20.3	21.8	20.3	19.2	18.4
Wis Ag 58	15.0	15.0	16.9	18.0	17.3	16.7	16.9	20.5	20.1	19.7	17.3	17.6
Wis Ag 59	15.4	15.6	16.9	18.4	17.3	16.2	18.2	20.3	21.4	19.7	18.8	18.0
B 2894-24	15.4	13.9	14.8	17.1	18.0	16.5	16.7	19.7	19.9	19.2	18.0	17.2
Triumph	15.6	14.1	15.6	18.2	16.9	15.8	16.9	19.4	19.9	18.6	18.8	17.2
Cobbler	17.1	16.7	17.5	19.0	17.5	17.1	18.2	20.7	21.6	18.8	18.2	18.4
<u>Medium to Late</u>												
Catoosa	-	13.1	14.1	15.4	15.8	14.1	15.4	19.7	18.2	17.7	17.7	16.1
La 42-45	14.8	-	15.6	17.1	17.3	16.7	16.2	20.7	20.3	-	17.7	17.4
La 91-78	15.6	16.2	17.7	18.2	18.6	16.9	17.7	20.7	21.4	-	18.0	18.1
Neb 38.49-6	17.5	15.8	16.2	17.5	18.6	18.2	19.0	19.4	20.9	20.7	18.6	18.4
Neb 201.55-3	16.0	15.6	17.5	18.8	18.0	16.7	18.4	21.8	21.4	21.2	18.0	18.5
Neb 302.50-5	17.1	15.6	17.3	17.7	18.6	18.0	17.5	23.7	20.9	20.1	18.4	18.6
ND 3815-1	16.0	14.3	16.7	17.5	17.7	15.8	17.3	-	20.5	19.4	17.3	17.2
ND 3740-11	14.1	13.7	16.5	17.5	16.9	15.4	16.7	18.2	19.9	19.0	17.1	16.8
B 3692-4	15.2	15.6	18.0	17.5	19.0	18.2	17.5	20.7	21.4	19.7	18.2	18.3
B 3696-13	16.0	16.0	18.4	18.4	18.2	17.5	18.0	19.7	22.0	20.9	19.9	18.6
Red Pontiac	15.0	13.9	13.9	15.0	17.7	15.0	15.8	18.6	18.8	19.4	18.0	16.5
Location Ave.	15.7	15.1	16.6	17.7	17.7	16.6	17.6	20.3	20.6	19.6	18.2	

^{1/} Percent total solids based upon attached table of conversion.

North Central table 4. Scab Reactions Reported^{1/}

	<u>Ind.</u>	<u>Iowa</u>	<u>Kans.</u>	<u>Minn.</u>	<u>Neb.</u>	<u>N. D.</u>	<u>Ohio</u>
<u>Early</u>							
I 1426-1	2-2	3-2	1-1	1-2	0-0	1-2	T-3
ND 4122-2	1-1	T-3	1-1	1-1	2-5	1-1	T-1
Wis Ag 29	1-2	3-2	1-1	2-1	1-5	1-1	2-2
Wis Ag 58	2-2	0-0	1-1	2-1	3-5	1-1	T-1
Wis Ag 59	2-5	3-1	2-3	2-2	2-4	T-1	T-2
B 2894-24	1-1	1-2	3-2	2-1	0-0	2-2	4-1
Triumph	2-3	2-2	2-2	3-1	3-4	1-1	1-3
Cobbler	2-3	3-3	4-1	2-1	3-3	2-2	2-2
<u>Medium to Late</u>							
Catoosa	-	3-1	1-1	0-0	2-4	1-1	0-0
La 42-45	2-3	1-3	1-1	2-1	2-4	1-1	-
La 91-78	2-2	1-3	3-1	2-1	1-4	1-2	-
Neb 38.49-6	2-3	3-2	1-1	2-2	1-4	1-1	T-2
Neb 201.55-3	2-5	3-2	2-1	2-1	0-0	1-2	T-3
Neb 302.50-5	1-1	2-2	2-1	2-1	3-4	1-2	1-2
ND 3815-1	2-2	3-1	2-1	1-2	-	1-1	T-1
ND 3740-11	0-0	T-2	1-1	0-0	0-0	T-1	0-0
B 3692-4	1-1	3-2	1-1	1-1	0-0	1-2	T-1
B 3696-13	1-1	2-2	2-1	1-1	2-5	1-1	3-1
Red Pontiac	2-4	1-3	3-1	3-2	2-4	1-2	2-2

1/

Area

Type

T = less than 1%

1 = 1 - 20%

2 = 21 - 40%

3 = 41 - 60%

4 = 61 - 80%

5 = 81 - 100%

1 = small, superficial

2 = larger, still superficial

3 = large, rough pustules

4 = large pustule, shallow holes

5 = large pustule, deep holes

North Central table 5. External and Internal Defects (Average for all locations)

	<u>Total</u> ^{1/}				<u>Total</u> ^{1/}			
	<u>Scab</u>	<u>Growth</u>	<u>Second</u>	<u>Sun</u>	<u>Free of</u>	<u>Hollow</u>	<u>Internal</u>	<u>Vasc.</u>
	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Pct.</u>	<u>Ext. Def.</u>	<u>Heart</u>	<u>Necrosis</u>	<u>Disc.</u>
<u>Early</u>								
I 1426-1	12.5	6.8	1.7	3.5	81.8	0.8	1.1	3.0
ND 4122-2	5.1	0.5	1.0	8.5	86.6	1.2	9.5*	5.1
Wis Ag 29	4.3	0.5	1.7	2.2	92.8	0.3	3.1	3.8
Wis Ag 58	8.4	3.5	2.0	11.6*	77.9	2.4	3.0	7.6*
Wis Ag 59	15.9	6.1	0.3	6.8	76.3	0.9	0.9	2.5
B 2894-24	17.4	2.5	3.8	8.0	75.7	3.6*	4.3	0.5
Triumph	30.8	3.6	4.1	3.3	74.8	0.0	0.3	3.6
Cobbler	30.9	1.3	2.5	6.6	68.9	3.3	2.4	11.0

continued

North Central table 5, continued.

Medium to Late

Catoosa	2.1	1.4	3.5	3.0	90.4	0.9	3.3	8.1*	87.1
La 42-45	11.4	1.8	1.0	3.2	86.4	0.4	0.6	3.5	95.4
La 91-78	17.7	0.5	0.9	6.4	80.5	0.1	2.3	6.2	92.4
Neb 38.49-6	19.5*	2.9	3.5	0.7	80.2	0.1	0.2	3.3	95.7
Neb 201.55-3	9.0	0.5	7.8	1.6	85.0	0.3	0.0	1.6	97.4
Neb 302.50-5	8.6	0.5	2.6	5.2	87.5	0.0	2.8	3.7	94.6
ND 3815-1	17.4	5.6	3.2	0.8	79.9	0.3	0.0	2.2	97.0
ND 3740-11	0.8	20.5*	11.3*	5.4	63.7	1.0	3.0	2.2	94.2
B 3692-4	10.8	3.2	1.2	19.8*	68.6	2.5	9.7*	1.4	87.3
B 3696-13	10.2	2.5	3.7	10.0*	80.1	2.3	9.3*	7.7*	80.8
Red Pontiac	18.6	1.3	5.0	2.5	79.8	0.8	1.3	3.2	95.6

1/ Ten locations only.

* Possible weakness in variety.

North Central table 6. Merit Ratings^{1/}

	<u>Ind.</u>	<u>Iowa</u>	<u>Kans.</u>	<u>La.</u>	<u>Mich.</u>	<u>Minn.</u>	<u>Mo.</u>	<u>Neb.</u>	<u>N.D.</u>	<u>Ohio</u>	<u>Wis.</u>	<u>Ave.</u>
<u>Early</u>												
I 1426-1			3		4							7
ND 4122-2						2		1	5			8
Wis Ag 29	5				2		3					10
Wis Ag 58				3	3	3						9
Wis Ag 59		2	5	4	5	1	2		2		2	23
B 2894-24										2	1	3
Triumph												
Cobbler												
<u>Medium to Late</u>												
Catoosa		4										4
La 42-45			4	5	1	5		4	1		4	24
La 91-78		1										1
Neb 38.49-6										4		4
Neb 201.55-3		5		1				5	3		3	17
Neb 302.50-5	4		2					3		3		12
ND 3815-1			1	2		4	4			5		16
ND 3740-11							5					5
B 3692-4		3							4			7
B 3696-13								2				2
Red Pontiac						1				1	5	7

1/ Merit points determined as follows: Merit Rating Merit Points

1	5
2	4
3	3
4	2
5	1

PACIFIC NORTHWEST

IDAHO (Aberdeen)

Walter C. Sparks

The main objective of the Aberdeen program continues to be the development of an improved Russet Burbank type. This includes resistance to Verticillium wilt, leafroll, and scab. During the years of 1957 and 1958 several thousand acres of potatoes were left unharvested in Eastern and Southcentral Idaho because of a tuber rot believed to be caused by a fungus, Fusarium solani var. eumartii. In 1959 and 1960 the occurrence of this disease was slight. Since this disease could become a serious problem, work is being done to develop resistant clones. Other diseases being considered are early blight and Rhizoctonia.

Because of the growth of the processing industry, increased emphasis is being placed on qualities needed in varieties for the various potato products, these include high specific gravity, as well as a narrow range, low reducing sugar content, ability to recondition, and other less well-defined characteristics.

In 1960 crosses were made involving 50 parental clones, selected for the characteristics outlined. A total of 226 different combinations were successful. Approximately 8000 seedlings were planted at Tetonia, Idaho, and from these 240 were selected for further testing. The seedlings included some from the Aberdeen program, the USDA, and Canada. In addition, approximately 3000 seedlings were grown at Aberdeen, Idaho, with 117 being selected.

The advanced selection plots located at Aberdeen and Rexburg, Idaho, were adversely affected by a late frost and by a chemical treatment of the seed pieces, resulting in poor stand; therefore, data could not be taken at either location.

A total of 190 clones were grown at Tetonia for increase, and 46 were saved for further testing.

The Potato Selection Committee met in Aberdeen November 18th, to evaluate the various lines in the breeding program. It was recommended that two clones, A170-9 and A175-7, be increased in a sizeable amount during 1961. A170-9 is a late, long-russet type with resistance to scab, some resistance to Verticillium wilt, and resistant to Fusarium rot in 1958 and 1959. A175-7 is a medium-late, oval-russet potato with high resistance to Verticillium wilt and resistance to scab. This clone has consistently given higher yields than the Russet Burbank variety, but apparently is of slightly lower processing quality.

SOUTHERN PROJECT
(Louisiana Headquarters)

T. P. Dykstra

In most southern States the spring crop was harvested several weeks later than usual due to a prolonged period of low temperatures that prevailed immediately after planting in January and February. Emergence was delayed about 8 weeks. For the remainder of the growing season the cool weather and rainfall was sufficient to produce satisfactory yield.

Crosses between disease-resistant white and red varieties, formerly essential to develop disease resistance in red varieties, has been largely discontinued. Seedlings from red and white crosses often showed disease resistance but their tuber color was invariably poor. The best red selections have been backcrossed to red varieties, primarily to intensify and improve the skin color. A number of fertile, red, disease-resistant seedlings possessing tubers of desirable shape and color have been selected by this method. The most promising ones are TL 6894, TL 6896 and TL 6875 which have been tested for yielding ability in southern States and for adaptation to growing conditions of the seed-producing areas in the northern States. During recent years these three seedlings and TL 1859 have been used extensively as parents in crosses with other red varieties.

Because of the improvement of tuber color in disease-resistant red seedlings, disease resistant white varieties are not exclusively required as parents to incorporate resistance to disease in red seedlings. The use of improved red selections as parents has accelerated the selection rate of disease-resistant seedlings that have the tuber shape, color, and other qualities required by the early potato producing areas in the South.

Seedling TL 6279, released to the growers as Catoosa in 1959, is the first red variety known to be resistant to both late blight and scab. The maturity of Catoosa is medium-early in the South but late in the North. In 4 locations in Louisiana and one in Alabama, northern-grown seed of Catoosa, Pontiac and Red LaSoda showed no significant differences in yield. Twenty-five percent of the tubers of LaSoda and Pontiac grown in the plot at Diamond were infected with scab, and 15 percent of their tubers showed scab pustules when grown in a similar plot in Baldwin County, Alabama. The tubers of Catoosa grown in these two plots were completely free from scab infection (Dykstra table 1).

In an unsprayed field plot in Alabama the vines of Pontiac, LaSoda, and other susceptible varieties were killed by a natural infection of late blight while those of Catoosa were not infected.

In the spring of 1960, Catoosa, Pontiac, and LaSoda were tested under commercial growing conditions in Baldwin County, Alabama. Two 500 foot rows were planted with seed pieces of each variety obtained from the same source in Wisconsin. Low temperatures delayed equally the emergence of these varieties. Fifty days after emergence their vines were killed with an application of sodium arsenite and 8 days later harvested. The Pontiac and Catoosa yielded 148 cwt. per acre compared to 189 for Red LaSoda.

The Catoosa variety has been tested in practically every potato growing State in this country. High yields have been reported in some northern States. A commercial grower in Pine Bluffs, Wyoming, reported that he planted 45 seed pieces of Catoosa this spring in an irrigated field and produced an average yield of 4 pounds per hill.

The development of red varieties continues to be a major objective of the potato-breeding program in the southeastern States. There is also a need for disease-resistant white varieties to meet market requirements of the South.

A promising white selection is TL 6937 which is resistant to blight and scab. It has smooth, long tubers with high specific gravity. It is excellent for baking and chipping. In the southern States TL 6937 has produced good yields. Climatic conditions favoring the development of second growth and knobs on long tubered varieties like Burbank, have little effect on the tuber shape of TL 6937. Also, it has been sent to several northern States for testing and has been rated as superior in a few States. Additional information on its performance is needed before this selection can be considered for release as a variety.

Dykstra table 1. Average yield of U. S. No. 1 tubers in bushels per acre at five locations, 1960.

Location	Plot		Catoosa		Pontiac		Red LaSoda	
	Reps.	Size	Yield	Scab	Yield	Scab	Yield	Scab
			Bu.	Pct.	Bu.	Pct.	Bu.	Pct.
Fairhope, Ala.	3	25 ft.	350	0	320	15	360	15
Diamond, La.	3	25 ft.	312	0	261	25	391	25
Baton Rouge, La.	3	25 ft.	334	0	312	0	261	0
" " La. ^{1/}	4	20 ft.	195	0	195	0	277	0
New Roads, La.	4	40 ft.	240	0	225	0	240	0
Average			286		263		306	

^{1/} Regular trial.

Dykstra table 2. Seedling yields at New Roads, Louisiana^{1/}

Acc. No.	Parentage	U. S. No. 1 tubers per acre		Average solids
		Bu.	Pct.	
Pontiac ^{2/}		275	17.5	
Catoosa ^{2/}		255	16.0	
LaSoda ^{2/}		250	16.0	
Catoosa		245	16.0	
TL 6866	2910-1 x B 3131-8	240	18.6	
TL 6875	B 2368-4 x B 3131-8	225	18.8	
TL 6896	2910-1 x B 3131-8	220	18.2	
TL 7292	1354 x 96-56	215	18.4	
TL 6894	2910-1 x B 3131-8	205	19.0	
TL 6861	2910-1 x B 3131-8	205	18.0	
TL 6937	B 792-88 x B 962-32	205	19.0	
TL 7194	12-192 x 22-194	150	18.6	
TL 6945	B 2875-8 x B 6316	110	19.2	
TL 7192	96-167 x 92-23	105	15.8	
L.S.D. 5%		53.1		
L.S.D. 1%		72.5		

^{1/}Average 43 replications of 25 plants each spaced 12 inches apart in rows 6 ft.wid.

^{2/}Seed tubers obtained from Wisconsin; remainder came from Tennessee.

Dykstra table 3. Seedling yields at Baton Rouge, Louisiana.^{1/}

Acc. No.	Parentage	U. S. No. 1	Average
		tubers per acre	solids
		Bu.	Pct.
Catoosa ^{2/}		334	16.2
Catoosa ^{2/}		315	16.2
Pontiac ^{2/}		312	17.5
TL 6894	2910-1 x B 3131-8	291	19.7
TL 6896	2910-1 x B 3131-8	262	18.6
LaSoda ^{2/}		261	16.5
TL 6937	B 792-88 x B 962-32	246	19.7
TL 7118	B 929-32 x B 3556-12	246	19.4
TL 7194	12-192 x 22-194	225	18.4
TL 6945	B 2875-8 x B 6316	165	20.3
L.S.D. 5%		69.3	
L.S.D. 1%		95.1	

^{1/} Average of 3 replications of 25 plants, each spaced 12 inches apart in rows 4 feet wide.

^{2/} Seed tubers obtained from Wisconsin; remainder came from Tennessee.

Dykstra table 4. Seedling yields at Port Sulphur, Louisiana.^{1/}

Acc. No.	Parentage	U. S. No. 1	Average
		tubers per acre	solids
		Bu.	Pct.
LaSoda ^{2/}		391	19.3
TL 2988	B 96-56 x Sebago	328	21.0
Catoosa ^{2/}		312	18.8
TL 6866	2910-1 x B 3131-8	302	18.8
Pontiac ^{2/}		261	17.8
TL Catoosa		247	18.8
TL 6875	B 2368-4 x B 3131-8	225	20.0
TL 6896	2910-1 x B 3131-8	225	20.0
TL 6937	B 792-88 x B 962-32	204	21.2
TL 6894	2910-1 x B 3131-8	165	19.6
TL 6861	B 2368-4 x B 3131-8	150	18.2
L.S.D. 5%		43.2	
L.S.D. 1%		58.2	

^{1/} Average of 3 replications of 25 plants each, spaced 12 inches apart in rows 4 feet wide.

^{2/} Seed tubers obtained from Wisconsin; remainder came from Tennessee.

Dykstra table 5. Seedling yields at Fairhope, Alabama.^{1/}

Acc. No.	Parentage	U. S. No. 1	Average
		Yield	solids
		Bu.	
LaSoda ^{2/}		360	19.0
Catoosa ^{2/}		350	19.0
Pontiac ^{2/}		290	18.6
Catoosa		260	19.0

continued

Dykstra table 5, continued.

TL 2988	B 96-56 x Sebago	260	19.4
TL 6875	B 2368-4 x B 3131-8	240	19.7
TL 6894	2910-1 x B 3131-8	230	19.2
TL 6896	2910-1 x B 3131-8	220	19.2
TL 6937	B 792-88 x B 962-32	190	19.7
TL 7194	12-192 x 22-194	180	19.7
TL 6861	2910-1 x B 3131-8	170	19.9
TL 7192	96-167 x 92-23	170	17.7
TL 6945	2875-8 x 6316	140	19.9
L.S.D. 5%		68.3	
L.S.D. 1%		92.3	

- 1/ This test conducted in cooperation with Frank Garrett. Three replications per plot (25 plants) planted; plants 12 inches apart in rows 3 feet wide.
2/ Seed tubers obtained from Wisconsin; remainder came from Tennessee.

Dykstra table 6. Seedling yield trials at Baton Rouge, Louisiana, 1960.^{1/}

Acc. No.	Parentage	U. S. No. 1	Average
		tubers per acre	solids
		Bu.	Pct.
TL 7713	B 2875-8 x B 3131-8	336	18.2
TL 7723	B 3131-8 x TL 6519	292	19.2
TL 7647	B 3964-1 x B 3952-3	270	18.4
TL 7653	A 119-8 x B 3099-5	270	18.0
TL 7655	A 119-8 x B 3099-5	255	
TL 7627	B 606-37 x Cherokee	240	
TL 7694	792-88 x A 180-25	240	19.0
TL 7657	B 606-37 x Cherokee	225	19.7
TL 7646	B 3964-1 x B 3952-3	225	
TL 7674	B 3114-12 x B 2131-3	216	19.0
TL 7612	B 922-3 x 627-164	216	
TL 7623	B 922-3 x 627-164	210	
TL 7637	B 3719-1 x B 3944-11	186	
TL 7618	B 922-3 x 627-164	165	18.4
TL 7714	B 2875-8 x B 3131-8	156	18.2
TL 7705	C 125-42 x B 381-2	135	18.4

- 1/ Three replications of 25 plants per plot.

U. S.-COLORADO POTATO EXPERIMENT STATION, GREELEY, COLORADO
S. A. Alfieri, Jr., and L. A. Schaal

All potato work and test plots are presently limited to two locations, the Greeley Station and the San Luis Valley Branch Experiment Station at Center, Colorado. The number of locations for observation and testing will be increased with the progress of the breeding program.

Cooperative research on cultural and insect control tests were conducted at the Greeley Station, Dr. H. W. Chapman, Department of Horticulture, and Dr. L. B. Daniels, Department of Entomology, both of Colorado State University Experiment Station, cooperating.

Observation and test plots at the Greeley Station were carried out on soil previously planted in alfalfa for 4 years. Twenty tons of barnyard manure per acre were applied and plowed in the spring previous to planting. A weekly spray program consisting of Dithane plus Dieldrin, Dithane plus Malathion, Dithane plus Parathion and TEPP, for 3, 4, and 6 weeks, respectively, was employed during the entire growing season. An appearance of aphids in late July, 1960 and again in August of the same year resulted in a rather heavy infestation of aphids, regardless of the spray program employed. All plots were rogued periodically throughout the growing season. Greenhouse indexing of potato lines harvested during 1960 reveals a rather high incidence of disease.

Breeding. The breeding program carried out in the winter season of 1960 placed emphasis on yield, quality and disease resistance. The incorporation of resistance to the common scab organism and the leafroll virus has received special attention since the diseases caused by these organisms pose a serious problem to potato production in many important centers of potato culture in the western region of the United States.

The source of many of the breeding lines incorporated in the breeding program was derived from the breeding program at Beltsville, Maryland. A total of 483 different crosses was made during this season.

First Year Seedlings. New seedling individuals were produced in the greenhouse during the summer of 1960 for planting in the 1961 growing season. Present plans are to grow approximately 20,000 new seedlings a year with the prospect of increasing this number in the future.

First-year seedlings were grown in plots at Greeley and on the San Luis Valley Branch Experiment Station, Center, Colorado. A total of 21,561 seedlings representing the progenies of 170 families were planted at the 2 locations. Based on horticultural characters, 583 selections were made from the total planted. The selections will be grown in 10-hill lots next year for further observation on horticultural type and for testing of disease resistance.

4-and 10-Hill Seedling Increase Lots. Single-hill selections numbering 130 in all were grown in the San Luis Valley in 1959. These seedling individuals were all grown in 4-hill increase lots both at Greeley and in the San Luis Valley. Out of the 130 (4-hill) lots, 14 selections were made from the San Luis Valley and 27 selections made from Greeley. All of the selections will be grown at the same 2 locations in 10-hill lots.

Similarly, 53 selections grown in 4-hills in 1959 were planted in 10-hill lots at both locations. From these 10-hill lots 7 selections were made in the San Luis Valley and 17 selections from Greeley. Where duplicate plantings of the same lots, 4-and 10-hillers, were made in 2 locations (Greeley and San Luis Valley) and indeed, even within the same field at Greeley as with the 10-hillers, the selection of the same individuals was only 60 percent, while 40 percent varied with a selection in only one location. All selections made from the 4-and 10-hillers will be placed in 10-hill lots again in 1961 for further observation and testing for performance and disease resistance.

Variety Yield Trial. Seed stock of 25 varieties and advance selections secured from the San Luis Valley Branch Experiment Station were placed in a yield trial at the Experiment Station at Greeley. The incidence of virus disease was high enough so as to discard this test as a yield trial. However, data pertaining to relative adaptability and specific gravity were obtained. Since spindle tuber disease was widely prevalent in all entries, specific gravity determinations were made for a comparison of healthy lots and spindle-shaped tubers. Greeley table 1. presents these data based on one random sample from each entry. The remaining stocks from this trial were harvested and saved for greenhouse indexing.

Cooperative Tests for Control of Insects Transmitting Potato Viruses. This research was done as a cooperative project between Dr. L. B. Daniels and Mr. L. E. Jenkins of the Department of Entomology, Colorado State University Experiment Station, Fort Collins, Colorado and the U. S.-Colorado Potato Experiment Station, Greeley, Colorado.

The leafroll study was carried out by planting numbered tubers that were harvested in the fall of 1959. The plants were examined in July for symptoms of leafroll. The following Greeley table gives the insecticide used, type of application, aphid count during the 1959 growing season, and the incidence of leafroll in a random sample of 100 tubers from each plot planted in the field in 1960.

In 1959 the results in the same type of test indicated that the incidence of leafroll might be related to the population of aphids present. The results this year (1960) indicate that the theory is not entirely true. A factor of greater influence than the number of aphids present would be the percent of viruliferous aphids in a population.

Applications of a single insecticide for aphid control were made to determine if effective control could be obtained by using one material (Systox) at different time intervals between applications. Time intervals at which applications were made included two-, three-, four-, five-, and six-week intervals. The following Greeley table 3 shows the effectiveness of the spray applications at the different time intervals. The untreated plots show a rapid increase in the aphid population starting in July. The aphid population in the plots sprayed at two-week intervals were kept at very low levels and only a slight increase in numbers occurred. At the three- and four-week intervals the populations averaged above the two-week interval, yet considerably below the untreated plots. It will be noted that there is a definite drop in numbers following each spray application.

The five- and six-week treatments kept the aphid population well below the number on the untreated plots. The control measures do not appear to be too effective in these plots as there was an increase in numbers following the application of the insecticide.

The complex of predators in the plots gradually increased during the season and were not influenced by the insecticide used. At the spray intervals of two, three and four weeks it appears that the predator population was beneficial. In the plots of five- and six-week spray interval, as well as in the untreated plots, very little if any benefit was obtained from the predator populations. The aphid population increase potential was too great for the predators to overcome.

For maximum control of aphids and possible reduction of virus spread it appears that a control program on potatoes should be established so that the spray application interval will be two weeks or less. Shorter periods of time may be necessary where certified seed is being produced.

Date of Potato Harvest Study. A cooperative research project made up of three studies namely, date of harvest, date of planting, and seed size and spacing, was done between Dr. Harold W. Chapman of the Department of Horticulture, Colorado State University Experiment Station, Fort Collins, Colorado, and the U. S. - Colorado Potato Experiment Station, Greeley, Colorado.

Five varieties (Kennebec, Russet Rural, Haig, Blanca, and Katahdin) were selected for planting in the 1960 plot at Greeley, Colorado. All seed was grown in 1959 by the Colorado State University Demonstration Farm at Center, Colorado. Following cutting, the seed was healed for one week in a warm room (65° F) with 90-95 percent relative humidity. The plot was planted on May 16 with excellent soil conditions. Three replications of each variety at each harvest date were provided. The field had previously been in alfalfa for four years and was plowed, disked and leveled before planting. The potatoes were irrigated at weekly intervals during the summer starting on June 24. Each irrigation was preceded by a weekly spray application as mentioned above.

Greeley table 4 includes total yields per acre for 1958, 1959, and 1960. Haig was entered for the first time in 1960. Small differences in yield cannot be considered of any consequence particularly if other years did not show the same trend. Greeley table 5 gives the percent grade of the varieties in these trials.

Yields were low on the early-harvest date although Haig was affected less than the other varieties. The potatoes skinned badly and were difficult to handle on that date. Highest yields were recorded at the medium-harvest date. This has been usually true with all varieties tested except Russet Rural. Harvesting potatoes the last two weeks of September results in higher yields and avoids chilling the potatoes to be used for chipping before they are harvested. Highest yields of U. S. No. 1 tubers of Blanca and lowest yields with Russet Rural can be expected consistently.

Date of Potato Planting Study. Five varieties (Kennebec, Russet Rural, Haig, Blanca and Katahdin) were selected for planting in the 1960 trial at Greeley, Colorado. All seed was grown in 1959 at the Colorado State University Demonstration Farm at Center, Colorado. Following cutting, the seed was healed for one week in a warm room (65°F.) with 90 to 95 percent relative humidity. The seed for the late planting was stored at 40°F. until used. In addition to this test, potatoes of these same varieties plus some additional ones were planted on June 15 in another plot at the U. S.-Colorado Potato Experiment Station, Greeley, Colorado, and on July 1 at the Horticulture Farm in Fort Collins. The potatoes at Greeley were harvested on October 7 while those at Fort Collins were harvested November 1. The potatoes at Greeley were grown on alfalfa ground which was plowed, disked, and leveled before planting. The potatoes were irrigated at weekly intervals during the summer starting on June 24. Each irrigation was preceded by a weekly spray application consistent with the studies above.

Three replications of each variety were planted on each date. The individual plots were two rows wide and fifty feet long. Greeley table 6 includes total yields per acre from past years including 1960. Greeley table 7 gives the percent grade of each variety in this trial. Small differences in yield cannot be considered of any consequence particularly if other years did not show similar trends.

Equally high total yields may be expected from the early and medium planting dates. Plantings made on June 15 or July 1 were definitely lower in yield and had a higher percentage of U. S. No. 1's. Large numbers of B size potatoes were produced. The low yield of Russet Rural when planted late was related to seed piece decay which was evident at planting time. This variety was again consistently below the others in yield.

The percentage of U. S. No. 1's was lowest with Kennebec. This variety did not make a good looking pack after grading. Kennebec yielded best when planted near the middle of May in all three years.

Potato Seed Size and Spacing Study. Six varieties (Pontiac, Russet Rural, Kennebec, Norland, Blanca, and Haig) were planted in the 1960 tests. Seed potatoes were obtained from the Colorado State University Demonstration at Center, Colorado. Tubers were weighed individually into two size ranges; 150 to 210 grams and from 70 to 100 grams. The larger size tubers were then cut into halves (0.2 lbs) and quarters (0.1 lbs) for planting. The smaller size range (70 to 100 grams) tubers were planted whole. Seed was placed into a healing chamber (65°F.--85 to 90 percent relative humidity--with ventilation) for one week following cutting. All seed pieces were well healed and in good condition at planting time (May 16). All potatoes were harvested on October 7 and 8 following vine beating on October 1. The land had previously been in alfalfa for four years and was plowed on April 20, followed by leveling and disking. The crop was sprayed as described above.

Each yield figure represents the mean of three replications in the field. Cumulative results for past years as well as for 1960 are included in Greeley table 8. The potatoes were graded during the first week of November, and the results are given in Greeley table 9.

The cost of seed potatoes should be considered by growers making decisions with regard to planting rates. If seed costs are high, lower planting rates should be used. If seed costs are low, higher planting rates would be profitable. Growers with yields from 400 to 500 sacks per acre will find the higher planting rates most suitable and those whose potato yields are usually lower will profit with lower rates of seeding. All evidence seems to indicate that larger size seed pieces may be most desirable. Growers might consider larger seed pieces from the standpoint of lower cutting cost and greater returns per acre. Plant spacing seems to be important with regard to size of potatoes produced.

Probably more important than either seed size or spacing distance is the weight of seed planted per acre. This factor will closely correlate with the stem population per acre which in turn will determine the potato tuber population per acre. Whole seed will produce a higher stem population per acre than cut seed.

Tuber Net-Necrosis in Russet Rural. Russet Rural potatoes from the date of planting and date of harvest experiments were examined for net necrosis during grading on November 1. A random selection of tubers passing over the grader were clipped at the stem end. Greeley table 21 gives the percentage of tubers showing internal discoloration at harvest time for the date of planting and date of harvest trials. This test indicates that neither date of planting or harvest affected the incidence of net necrosis in Russet Rural. The discoloration was typical of that observed by growers in 1960.

Studies on the Antagonism between Streptomyces and other Fungi. Studies on the antagonistic action of Streptomyces sp. on other soil fungi were continued. Specific tests with Streptomyces races known to be parasitic on potato tubers were found to be no more antagonistic to other fungi than those races of Streptomyces found to be non-parasitic on potato tubers.

When expressed in terms of total inhibition (in mm) on culture medium a strongly parasitic race of Streptomyces was only slightly different from a non-parasitic race. There appears to be no correlation between parasitism and antagonism to other fungi. Mucor sphaerosporus and Rhizopus oryzae grew over all races of Streptomyces tested. Botrytis cinerea grew over most of the Streptomyces.

Results of these studies also indicate that races of Streptomyces may be differentiated by the inhibition shown between the species of Streptomyces and the fungus tested. A Streptomyces culture may appear identical morphologically and parasitically, but show differences in amount of antagonism to one or more species of fungi. Thus indicating that physiological differences exist.

Seed Treatment Experimented with Phenolic Compounds. Work on the evaluation of several phenolic compounds for the treatment of cut seed of potatoes was continued. A dust formulation of two phenolic compounds, (1) trihydroxybutriphenone and (2) trihydroxybenzoic acid were tested on cut seed that was planted in the Red River Valley of North Dakota during the season of 1960. Since only a 25 percent formulation of these phenolic compounds are required for seed treatment in a dust form, it was important that the chemical be thoroughly mixed with the carrier Pyrax. An attempt was made to accomplish this mixing by dissolving the phenolic compound in alcohol, mixing the material with the carrier dust in a slurry, then drying and regrinding the mixture in a ball mill. Another method involved the mixing of the phenolic compound with a small amount of the Pyrax then mixing to the proper dilution in a commercial dust mixer. This latter method was found to be superior to the first method. There was considerable oxidation of the phenolic compound when the material was mixed with alcohol. The results obtained in North Dakota indicate that the treatment of cut seed with the dust formulations of both phenolic compounds increased stand and yield.

Laboratory studies on the thickness of the suberized layer induced on the cut surface of a potato tuber by the several phenolic compounds showed that the two compounds (1) and (2) increased the thickness by weight of the protective suberin layer by more than 3-fold over that of the controls. There is a continued demand for the development of an effective potato seed piece treatment in a dust form which increases ease of handling and application. Previous experiments have shown that catechol, a phenolic compound to be very effective, but under certain conditions attributed to component chemical constituents and poor mixing with the carrier, there have been reports of injury to the seed piece by the free phenol in the catechol. The phenolic compounds now under test do not injure cut seed of potatoes even in high concentrations.

Greeley table 1. Comparison of the specific gravity^{1/} of 25 varieties grown at Greeley, Colorado, 1960.

Variety	Spindle Shaped Tubers	Healthy Tubers	Variety	Spindle Shaped Tubers	Healthy Tubers
Pontiac	1.060	1.064	CS 11918	1.074	1.083
M-20	2/	1.074	Navajo	1.077	1.076
Blanca	1.071	1.079	CS 13153	1.080	1.082
Kennebec	1.070	1.066	Delus	1.076	1.085
CS 13222	1.074	1.070	Canso	1.077	1.076
Rushmore	1.068	3/	CS 13950	1.080	1.078
Huron	1.066	1.085	CS 11889	1.079	1.078
R. Rural	1.074	1.074	Haig	1.075	1.073
Keswick	1.069	1.071	Saco	1.073	1.081
CS 13925	1.072	1.075	Excel	1.077	1.080
Bounty	1.066	1.069	CS 13928	1.085	1.083
Norland	1.060	1.064	CS 13951	1.075	1.080
CS 11888	1.075	1.072			

^{1/} Determined by an 8-pound sample of potatoes weighed in air and in water.

^{2/} No spindle tuber observed.

^{3/} All spindle tuber shaped.

Greeley table 2. Incidence of leafroll using different insecticides, Greeley, Colorado, 1960.

Plot	Insecticide	1959	1960
		Aphid Count	Incidence of Leafroll
1	Systox (foliage)	145	3
2	Thimet (soil)	434	3
3	Untreated	533	2
4	Di-syston (soil)	381	2
5	Thimet (foliage)	32	0
6	Thimet (soil)	198	3
7	Thiodan (foliage)	53	5
8	Di-syston (soil)	301	5
9	Untreated	167	4
10	Systox (foliage)	70	2
11	Thiodan (foliage)	99	3
12	Thimet (foliage)	88	3
13	Dithane (foliage)	539	1

Greeley table 3. Effectiveness of Systox spray applications, as measured by aphid counts, at different time intervals, Greeley, Colorado.

Plot	June July					August					Interval Weeks
	28	5	12	18	26	1	9	16	23	30	
1	*	25	*	59	*	100	*	46	*	36	Two
2	*	26	81	*	27	186	*	62	345	122	Three
3		73	333	173	163	290	1002	1355	3858	229	Untreated
4	*	24	*	24	*	29	*	34	*	27	Two
5		67	194	191	145	293	1055	1472	3624	838	Untreated
6	*	16	71	116	*	19	56	112	*	114	Four
7	*	18	66	98	94	257	*	478	518	118	Six
8		87	241	144	146	389	1083	2992	4060	416	Untreated
9	*	26	*	33	*	70	*	62	*	10	Two
10	*	40	128	107	148	*	102	594	870	261	Five
11	*	35	*	38	*	63	*	161	*	24	Two
12		162	327	144	284	939	2254	3548	2888	50	Untreated

Greeley table 4. Total yield of 5 varieties grown for 3 years and harvested on 3 different dates at Greeley, Colorado.

Harvest Date	Kennebec-Yield Per Acre				Russet Rural-Yield Per Acre			
	1958 ^{1/}	1959 ^{2/}	1960 ^{3/}	Mean	1958 ^{1/}	1959 ^{2/}	1960 ^{3/}	Mean
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Early	252	231	198	227	218	110	136	155
Medium	322	306	324	317	290	155	209	218
Late	302	278	286	287	276	218	235	243
	Blanca-Yield Per Acre				Katahdin-Yield Per Acre			
Early		283	270	277		255	224	240
Medium		330	340	335		326	321	324
Late		337	320	329		322	316	319
	Haig-Yield Per Acre							
Early			278					
Medium			309					
Late			291					

^{1/}Early, August 29; Medium, September 19; Late, October 8.

^{2/}" September 1; " " 15; " " 7.

^{3/}" " 1; " " 22; " " 11.

Greeley table 5. Grades in percentages of 5 varieties harvested at 3 different dates at Greeley, Colorado, 1960.

	No. l's	Throw outs	Over size	B Size
	Pct.	Pct.	Pct.	Pct.
Early Harvest				
Kennebec	75.6	11.0	1.2	12.2
Russet Rural	79.9	7.0	0.6	12.5
Haig	78.7	10.0	6.2	5.1
Blanca	88.0	3.0	0.0	9.0
Katahdin	78.8	5.3	10.3	5.6
Medium Harvest				
Kennebec	67.9	22.6	4.8	4.7
Russet Rural	85.5	5.1	4.7	4.7
Haig	78.8	5.7	12.4	3.1
Blanca	86.2	5.3	3.2	5.3
Katahdin	79.3	4.8	12.6	3.3
Late Harvest				
Kennebec	69.2	20.8	4.0	6.0
Russet Rural	88.1	6.1	2.2	3.6
Haig	83.8	5.7	5.6	4.9
Blanca	84.0	6.4	4.2	5.4
Katahdin	73.4	11.3	12.0	3.2

Greeley table 6. Total yield of 5 varieties planted on 3 different dates for 3 years at Greeley, Colorado, 1960.

Planting Date	Kennebec-Yield Per Acre				Russet Rural-Yield Per Acre			
	1958 ^{1/}	1959 ^{2/}	1960 ^{3/}	Mean	1958 ^{1/}	1959 ^{2/}	1960 ^{3/}	Mean
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Early	281	306	289	292	226	171	178	205
Medium	290	345	333	323	294	161	112	189
Late	106	316	234	219	81	224	50	118
Blanca-Yield Per Acre					Katahdin-Yield Per Acre			
Early		370	292	331		343	330	336
Medium		407	303	355		374	297	336
Late		333	218	276		310	251	280
Haig-Yield Per Acre								
Early			227					
Medium			292					
Late			111					

1/Early, May 1; Medium, May 20; late, June 5.
2/ " " 1 " " 18; " " 5.
3/ " " 4 " " 16; " " 1.

Greeley table 7. Grades in percentages of 5 varieties planted on 3 different dates at Greeley, Colorado, 1960.

Variety	No. 1's Pct.	Throw outs Pct.	Over size Pct.	B Size Pct.
Early Planting				
Kennebec	74.7	17.0	2.8	5.4
Russet Rural	82.5	9.8	4.8	2.9
Haig	85.3	7.5	3.2	4.0
Blanca	81.2	8.4	4.1	6.3
Katahdin	71.3	9.1	16.4	3.1
Medium Planting				
Kennebec	72.1	17.7	3.5	6.7
Russet Rural	82.4	6.8	5.8	5.0
Haig	87.0	4.9	4.3	3.8
Blanca	80.6	8.4	4.1	6.9
Katahdin	74.2	7.7	15.0	3.1
Late Planting				
Kennebec	70.8	20.3	0.9	8.0
Russet Rural	----	----	---	---
Haig	87.9	5.8	2.4	3.9
Blanca	76.8	14.0	0.0	9.2
Katahdin	73.1	8.3	14.8	3.8

Greeley table 8. Effects of seedpiece size and spacing on the yields of 6 varieties grown at Greeley, Colorado, 1958, 1959, and 1960.

Spacing and Size	Pontiac Yield Per Acre				Seed Planted/Acre in 1960
	1958 ^{1/}	1959 ^{2/}	1960 ^{3/}	Mean	
	Cwt.	Cwt.	Cwt.	Cwt.	Cwt.
Wide spacing, 0.1 lb. cut seed	286	204	357	282	12.5
" " 0.2 lb. cut seed	352	271	426	350	24.9
" " 0.2 lb. whole seed	384	274	406	355	24.9
Narrow spacing, 0.1 lb. cut seed	332	243	357	311	24.9
" " 0.2 lb. cut seed	364	293	384	347	49.8
" " 0.2 lb. whole seed	388	325	415	376	49.8
Russet Rural Yield Per Acre					
Wide spacing, 0.1 lb. cut seed	230	178	225	211	12.5
" " 0.2 lb. cut seed	313	198	261	257	24.9
" " 0.2 lb. whole seed	319	249	298	289	24.9
Narrow " 0.1 lb. cut seed	274	165	247	229	24.9
" " 0.2 lb. cut seed	283	233	255	257	49.8
" " 0.2 lb. whole seed	315	210	303	276	49.8

continued

Greeley table 8, continued.

				Kennebec Yield Per Acre
Wide spacing	--	0.1 lb. cut seed	272	262 267 12.5
"	"	-- 0.2 lb. cut seed	291	268 279 24.9
"	"	-- 0.2 lb. whole seed	283	296 289 24.9
Narrow spacing	--	0.1 lb. cut seed	268	273 270 24.9
"	"	0.2 lb. cut seed	290	298 294 49.8
"	"	0.2 lb. whole seed	316	350 333 49.8

Yield Per Acre Of:

				Norland 1960 ^{3/}	Blanca 1960 ^{3/}	Haig 1960 ^{3/}	
Wide spacing	^{1/} --	0.1 lb. cut seed	313	329	313	12.5	
"	"	--0.2 lb. cut seed	340	394	349	24.9	
"	"	--0.2 lb. whole seed	358	398	381	24.9	
Narrow spacing	--	0.1 lb. cut seed	324	366	350	24.9	
"	"	--0.2 lb. cut seed	349	399	368	49.8	
"	"	--0.2 lb. whole seed	353	409	388	49.8	

<u>1/</u> Wide spacing--16" in the row	Narrow spacing -- 8" in the row
<u>2/</u> Wide spacing--16" in the row	Narrow spacing -- 8" in the row
<u>3/</u> Wide spacing--14" in the row	Narrow spacing -- 7" in the row

Greeley table 9. Yield in Cwt. per acre of each grade of the listed varieties and seed sizes and spacings in 1960.^{1/}

	<u>Kennebec</u>				<u>Blanca</u>			
	No.	Throw	Over	B	No.	Throw	Over	B
	1's	Outs	Size	Size	1's	Outs	Size	Size
Wide spacing--0.1 lb. cut seed	171	69	7	14	284	28	1	16
" " --0.2 lb. cut seed	186	57	9	16	348	24	-	22
" " --0.2 lb. whole seed	216	57	2	21	348	26	-	24
Narrow spacing 0.1 lb. cut seed	205	49	4	15	322	22	-	22
" " 0.2 lb. cut seed	222	44	3	29	343	18	-	38
" " 0.2 lb. whole seed	251	63	12	24	354	16	-	39
	<u>Haig</u>				<u>Norland</u>			
	No.	Throw	Over	B	No.	Throw	Over	B
	1's	Outs	Size	Size	1's	Outs	Size	Size
Wide spacing--0.1 lb. cut seed	262	25	14	11	276	15	8	14
" " --0.2 lb. cut seed	283	26	25	15	300	17	6	17
" " --0.2 lb. whole seed	310	34	20	17	318	19	1	20
Narrow " --0.1 lb. cut seed	299	22	16	13	283	16	5	20
" " --0.2 lb. cut seed	311	24	13	20	294	21	-	34
" " --0.2 lb. whole seed	328	24	9	27	297	25	5	26
	<u>Pontiac</u>				<u>R. Rural</u>			
	No.	Throw	Over	B	No.	Throw	Over	B
	1's	Outs	Size	Size	1's	Outs	Size	Size
Wide spacing--0.1 lb. cut seed	242	28	76	11	194	21	3	7
" " --0.2 lb. cut seed	313	29	72	12	234	16	2	9
" " --0.2 lb. whole seed	326	24	44	12	271	16	-	10
Narrow " --0.1 lb. cut seed	273	23	47	14	220	14	4	9
" " --0.2 lb. cut seed	321	17	27	19	226	13	-	16
" " --0.2 lb. whole seed	361	12	18	24	272	7	2	21

^{1/}See Greeley table 8 footnotes 1, 2, and 3 for spacings.

Greeley table 10. Percentage of Net Necrosis in Russet Rural Tubers, grown at Greeley, Colorado, 1960.

<u>Planting Date</u>	<u>Net Necrosis</u>	<u>Harvest Date</u>	<u>Net Necrosis</u>
	Pct.		Pct.
May 4	30	Sept. 1	34
May 16	34	Sept. 22	25
June 1	40	Oct. 11	31

ALASKA
C. H. Dearborn

Alaska 1961 variety evaluation and note on frost resistance.

Introduced Varieties and Seedlings - Each year a few potato clones, both named and numbered, are introduced for evaluation. Varieties Kennebec, Ontario, Red Beauty and Norland have been added in recent years to Alaska's list of recommended varieties because each has characteristics not found in other varieties.

In 1959 S. ajanhuiri PI 233980.2 and S. phureja PI 205561.1 were introduced as tubers. S. ajanhuiri produced large, white fleshed tubers with a specific gravity of 1.067 as compared to Glenmeer's 1.076. Hollow heart and stolon girdle were severe on S. ajanhuiri. S. phureja under the same growing conditions did not tuberize. Rode Eersteling, PI 237749, a very pretty red skinned potato with yellow flesh, showed extensive vascular staining. The specific gravity was 1.079. Glenmeer was included in order to learn if frost resistance claimed for the variety actually was significant. Its vines were frosted the same as other non-frost resistant varieties of potatoes.

Other named varieties grown for the first time were Boone, Bounty, Huron, Navajo and Sirtema. None were considered outstanding in 1959 or 1960.

Louisiana seedlings La 42-45, 61-125 and 61-162 showed severe leafroll symptoms very early in growth and were all discarded. La 61-162 was slowest in manifesting leafroll.

Nebraska seedling 114.49-1x was discarded for what appeared to be yellow dwarf disease. Seedling 45-51-3 developed small plants with very pointed leaves and twisted leaflets suggestive of spindle tuber. Second growth disfigured many tubers.

Varieties Avon and Fundy, grown for the first time in 1960, were distinct in plant type and leaf color. Top growth was approximately one-third less than that of most varieties. The lower leaves of both varieties were distinctly chlorotic, Avon being most affected. Areas affected were yellow and patchy although yellowing did not involve the main and principal lateral veins of the leaves. Huron showed a similar chlorosis in 3 of 5 tuber units. There was also some evidence of the chlorosis in Rode Eersteling, Saco, Wisconsin 29, and 56. Alaska's foundation stock of Green Mountain had normal leaf color in the check plot adjacent to these other varieties.

Frost Hardy Potato Tops - Since 1955, considerable progress has been made in breeding and selecting potatoes with frost hardy tops. Several clones in 1960 withstood nine field frosts of varying severity, one temperature dropping to 25°F. Visible frost injury to foliage even at this low temperature was practically nil. Good tuber size has been attained in one clone.

CALIFORNIA
Glen N. Davis

Potatoes were grown experimentally at Shafter, Hollister and Davis in 1960. The Shafter planting included a variety yield test and a seedling plot. Twelve named varieties and five seedlings were planted in the yield test. Where seed was available each lot was replicated five times (25 seedpieces per replicate). Data (California table 1) include yield in pounds per replicate and specific gravity. Only one lot, U.S.D.A. seedling B 2368-4, produced significantly higher than the check variety White Rose. Three of the replicated lots, Kennebec, Osage and B 73-3, gave a yield significantly lower than White Rose.

Norland and Catoosa, two new red varieties, were compared with Pontiac, the red variety most widely grown in California. There was no significant difference in yield between the three. The tuber shape and color of Norland were more appealing than that of either Pontiac or Catoosa. The tuber shape of Catoosa was quite satisfactory but the color was not attractive.

The seedling plot at Shafter included approximately 8,000 seedlings representing 34 different parental combinations. The tubers from each seedling were evaluated for horticultural characteristics and 28 seedling lines were selected for additional testing. The specific gravity of the tubers from the selected seedlings was determined by use of brine solutions--a major interest being in the variation in specific gravity among tubers from the same plant. The smallest variation was .002 (7 tubers) from a seedling resulting from a cross of White Rose x A 452-1. The biggest variation was .024 (2 seedlings--8 and 7 tubers) from White Rose x Sequoia and Navajo x A180-25 respectively.

The Hollister planting included seven named varieties and fifteen numbered seedlings. The different lots were replicated one to four times depending on the available seed. Data were collected on yield, specific gravity and resistance to Verticillium wilt. Since the number of replications was not uniform, the yield data were not analyzed statistically and only the mean yields are presented.

Readings on Verticillium wilt were taken at weekly intervals starting when the first above ground symptoms started to appear and continued until most of the plants were dead. Readings were based on a scale of 0-5, 0 when no above-ground symptoms could be observed and 5 when all the plants in a replication were dead. One to four represented intermediate conditions with increasing severity from 1 to 4. Data are presented in California table 2.

There is some evidence that freshly dug potato seed is more resistant to Verticillium wilt than old seed which has been held in storage for several months. Freshly dug seed of two varieties, White Rose and Kennebec, was divided in two lots; one lot was treated with Gibberellin 1 ppm, the other was not treated. From each lot 150 seedpieces were planted. For some reason a rather poor stand was obtained from all four lots but the Gibberellin treated rows were superior to the untreated and produced approximately two times as many potatoes.

Unfortunately, an adjacent commercial field grown from stored seed which was harvested without our knowledge. Data on the treated and untreated new seed are given in California table 3.

At Davis during the spring of 1960, a large number of potato crosses were made in an inclosed screenhouse. Sixteen different parental varieties were combined in 56 different combinations. The seeds were planted in August and the resulting seedlings transplanted to No. 2- $\frac{1}{2}$ cans during September and October. Tubers from the cans will be planted at Shafter in the seedling plot in 1961. In addition, seed (tubers) of those lines selected in 1961 were increased for additional testing in the field in 1961.

California table 1. Potato variety yield test, Shafter, California, 1960^{1/}

Kind	Yield in pounds					Mean	Specific Gravity
	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5		
White Rose	40.0	49.5	38.5	53.0	47.0	45.6	1.074
Pontiac	34.5	55.0	40.5	59.0	37.0	45.2	1.069
Kennebec	40.0	26.0	40.0	43.0	26.0	35.0	1.075
Merrimack	47.0	32.5	54.5	49.0	58.0	48.2	1.077
Norland	40.5	47.0	36.0	45.0	50.0	43.7	1.070
Catoosa	34.0	52.0	55.5	42.5	62.5	49.3	1.067
Teton	30.0	48.5	45.5	51.5	44.0	43.9	1.076
Ontario	49.5	45.0	53.0	44.5	52.0	48.8	1.071
Chippewa	39.0	42.0	36.0	41.5	40.0	39.6	1.066
Osage	39.0	28.0	36.5	35.0	34.6	34.6	1.075
N.D. 3815-4	45.5	49.0	34.0	49.5	47.0	45.0	1.075
B 2368-4	45.5	70.0	75.0	53.0	54.5	59.6	1.075
B 73-3	16.0	19.0	10.0	10.0	15.0	14.0	1.072
Navajo* <u>2/</u>	25.5					25.5	1.077
L6894* <u>27</u>	40.0					40.0	1.073
L6937* <u>2/</u>	32.0					32.0	
Blanca* <u>2/</u>	31.0					31.0	1.081

L.S.D. between means 7.78 lbs.

^{1/} Size of plot = .10 acre, fertilizer = 16-20-0 at 600 lbs. per acre.

^{2/} Not included in analysis.

California table 2. Potato yield and Verticillium test plot, Hollister, California, 1960^{1/}

Kind	Verticillium wilt reading				Mean yield pounds	Specific gravity
	8/24	9/2	9/8	9/15		
B 4460-8	2	2	4	5	27.5	1.082
B 4467-7	3	4	5		30.5	1.087
B 4488-3	0	4	4	5	17.7	1.085
B 4488-4	3	4	4	5	32.0	1.078
B 4488-5	0	2	3	4	34.0	1.082
B 4495-4	2	3	4	5	12.8	1.084
B 4093-18	0	3	3	4	30.0	1.080
B 3819-17	3	4	5		12.5	1.079
B 3653-15	2	3	4	4	9.3	--
Merrimack	0	3	4	5	34.6	1.086
B 2368-4 ^{2/}	0	2	3	3	59.0	1.086
B 73-3	2	3	4	5	5.8	--
Early Rose	2	3	3	4	11.7	1.083
Kennebec	0	1	3	4	11.2	1.079
Catoosa	0	3	4	5	7.0	1.074
Navajo	1	3	4	4	22.3	1.075
Early Ohio	3	4	4	5	7.0	1.080
L 6937	0	2	3	4	7.0	1.080
L 6894	0	3	4	4	2.0	--
A 180-26	0	2	3	3	36.0	1.083
Norland ^{2/}	3	3	4	5	40.8	1.083
B 3815-1R ^{2/}	1	3	3	4	42.1	1.083

^{1/} Size of plot = .10 acre, fertilizer = 16-20-0 at 600 lbs. per acre.

^{2/} These lots were chipped and all made acceptable chips.

California table 3. Yield of freshly dug, treated (Gibberellin 1 ppm) and untreated potato seed, Hollister, California.

Kind	Number seedpieces	Yield in pounds	Specific gravity
White Rose, ck	150	37.0	1.082
" " Tr.	"	60.0	1.084
Kennebec, ck.	"	35.0	1.076
" Tr.	"	83.5	1.083

CANADA (Ontario)
G. R. Johnston and R. G. Rowberry

Ontario Regional Potato Variety Trials

In 1960 these trials were conducted at ten locations in the Province of Ontario. At each 15 varieties were planted in a randomized block design with 4 replications. Row spacing was 36 inches and seed spacing 10 inches. The soil textures varied among stations from muck (Bradford) to clay loam (Mindemoya) but were mostly light. Thiordan gave excellent aphid control at the two stations where it was used. No late blight epidemics were encountered.

The weather in the 1960 growing season in Ontario was generally very favorable for potato production - relatively cool temperatures and fairly adequate rainfall with a dry harvesting season. Yields were normal and the total solids' contents were above average. Tuber lots from each variety and location were processed in the quality laboratories of the Ontario Agricultural College, Guelph, and the Smithfield Experimental Farm's Food Technology Laboratory.

The data of maturity, yields and total solids are presented in Ontario Tables 1 and 2.

Discussion of Results

A summation of the outstanding characteristics of each variety in the 1960 Regional trial follows:

Norland. Second year in trial. Vines mature earlier than Cobbler. Vigorous, bushy vines. Oblong, smooth, uniform tubers. Shallow eyes. Slightly netted, medium-red skin. Resistant to scab. Susceptible to wilt and most viruses. Sets heavily. Potential high yielder. Small size common in dry season. Solids' content generally low. Fair boiler and baker. Poor frier and chipper unless processed directly from field. Stores well only under controlled temperature. Licensed in 1959 as a replacement for Red Pontiac in Manitoba. Does not require further testing in this trial.

Irish Cobbler. Standard early variety. Very vigorous plants; nearly always produces a good stand. Rough, irregular, blocky tubers with light tan skins and deep eyes. Susceptible to most potato diseases yet is a dependable producer when planted early in the season. Good solids' content for an early. Good boiler and baker; fair frier; poor chipper. However, Cobbler is used extensively as an early-harvested chipper and french frier. Stores very well, even under uncontrolled conditions. Should be continued as the early standard.

B 605-10. Second year. Almost as early as Cobbler. Very vigorous, spreading vines with large, light-green leaves. Roundish, bright tubers that are often somewhat irregular in shape. Smooth, white skin. Apical eyes are often moderately deep to deep as in Cobbler. Tubers are quite susceptible to harvest cracks ("thumb-nail type"). Resistant to the common race of late blight; moderately resistant to scab; very susceptible to silver scurf; susceptible to most viruses, especially leaf roll. High yielding for an early variety. Comparable to Cobbler in solids. Good boiler and baker; poor chipper and frier. Good storage quality. Not recommended for further regional trial.

ND 3324-2. Second year. Medium-early maturity. Smooth, fairly uniform, shallow-eyed tubers with smooth, white skin - round to oblong in type but sometimes pointed at stem-end under dry soil conditions. Vines are very vigorous with broad, flat leaves. Susceptible to scab, wilt and most viruses. High yielding for a medium-early. Equal to Cobbler in total solids. Very good boiler and baker; poor frier and chipper. Stores well under controlled temperatures. Should be retested for a third year regionally.

F 4834. First year regionally but was in the National trials for several years. Vines mature medium-early. Vines are bushy, spreading and as vigorous as Cobbler. Tubers are generally oblong, smooth in shape, of good appearance with flaked to moderately netted skin of a dull cream color. Shallow eyes. Slight to moderate scab resistance; susceptible to most viruses. High yielding for a medium-early. High solids - 22.0 average in 1960. Generally a fairly good boiler and a very good baker but stem-end after-cooking darkening occurred at some locations especially when boiled. Fair chipper; fairly good french frier. Conditioning at 70°F. following 40°F storage lowered the reducing sugar level considerably but the color ratings were still poor to fair. Good storage ability. Probably should be re-tested regionally.

F 5317. First year. Medium maturity. Moderately vigorous plants with small leaves. Fairly good tuber appearance. Tubers are roundish, uniform, bright, small to medium in size with white, smooth skin. The apical eyes are medium to deep. Susceptible to scab and rhizoctonia; also to most viruses. Good set of tubers but a considerable percent are undersized thus reducing the yield of No. 1 size. The solids' content is average--about the same as Cobbler. A good boiler and very good baker with fair to good color. A fair chipper and french frier but with only fair to fairly good color. The reducing sugar did not decrease during the reconditioning period. Sprouts early in storage if temperature is not controlled. It is doubtful if this variety merits further trial.

F 5080. Third year. Vines mature medium to medium-late. Vines are distinctly upright and straggly; plants are often single-stemmed. Tubers are oblong, smooth, uniform with a flaked to slightly netted tan-colored skin. Eyes are shallow. They have good resistance to common scab. Plants are susceptible to most viruses and the crinkled leaves making mosaic roguing difficult. F 5080 has been the lowest in yield in this trial for 3 successive years. The tubers size well but the set is low. The total solids' are high consistently. F 5080 is a good boiler, very good baker, fairly good chipper and a very good french frier. It stores well under most conditions. Although F 5080 has some very desirable characteristics, its low yielding ability is its most serious drawback. High yielding potential is very important in present day commercial potato production.

F 5459. First year regionally. Vines mature medium-late. Very good plant vigor. Tubers oblong to long in shape; only fairly uniform; noticeable tendency to be pointed at stem-end; skin is dark cream color with rough flaking or moderate netting--an unattractive skin type. Eyes are shallow. Susceptible to russet-type scab, rhizoctonia and spindle tuber. Highest yield in trial. High average solids' content--23.6%. Excellent baker; good boiler; fair chipper and french frier. Marked tendency to stem-end darkening when boiled. Reducing sugar level builds up at 40°F. to a fairly high level but is lowered considerably when conditioned at 70°F. Sprouts early in storage if temperature is not

controlled. Should be retested regionally.

F 4724. First year. Vines mature medium-late but tubers size early (see Early Harvest data). Compact, sturdy plants with good foliar cover. Tubers mostly oblong, smooth, fairly uniform in shape; size well. Set is relatively low and oversize is common unless close spacing is used. Skin is bright, clean and usually flaked. Eyes shallow. Resistant to scab and silver scurf; susceptible to rhizoctonia and leaf roll. High in yield of No. 1 size; high percent of No. 1 size. Above-average solids. Good boiler; excellent baker; poor chipper; fair frier. Boils and bakes creamy white but darkens when fried. Reducing sugar level lowered by conditioning at 70°F. after 40°F. storage. Very good storing ability. Promising as a scab-resistant, boiling-baking variety that can be harvested early in the season. Should be retested regionally and placed in Block Increase Trial in 1961.

F 5350. Second year in regional trial. Matures its vines medium-late to late (a few days ahead of Katahdin). Tubers size about same as those of Katahdin. Tubers are roundish, slightly to moderately irregular in type with white skin that varies from slightly netted to flaked to smooth. Sets heavily. Apical eyes sometimes moderately deep. Tubers may not size well under adverse conditions. Top necrotic to virus x (mild mosaic) but quite susceptible to leaf roll. Susceptible to scab. Yields were average in 1960, good in 1959. Above-average solids--21.1% (1960). Very good boiler; excellent baker; poor french frier and chipper. Boils and bakes very white consistently; fries dark--second highest reducing sugar level in the trial. Good storage quality--resists sprouting in fall and winter. May be introduced by the Atlantic region. Apparently has no possibility as a french frier or chipper. Probably should be given a 3rd year in Regional Trial and increased by Plant Protection Division if licensed in 1961.

F 5143. First year. Vines mature medium-late to late. Sizes its tubers with Katahdin. Very good plant vigor. Lacks uniformity of size and shape of tubers--somewhat "Cobbler" in type. Apical eyes usually medium deep. Skin varies from smooth to flaked to slightly netted, depending on the location. Some locations report tendency to produce knobs and growth cracks. Susceptible to scab, rhizoctonia and spindle tuber and most other viruses. Yield is about equal to Sebago. Solids are high. Fairly good boiler and chipper; very good baker and good french frier. Conditions well after 40°F. storage (reducing sugar level lowered from 0.68 to 0.21). Good storage ability. May merit repeating in 1961 regional trial.

F 5348. First year. Vines and tubers mature with Katahdin (medium-late to late). Plants as vigorous as Sebago but more compact. Tubers vary in type from roundish to oblong and from smooth to rough. The skin type varies from location to location--smooth to flaked to netted. The depth of eyes varies from shallow to deep (locations). This variety appears to vary greatly with environment as far as tuber type is concerned. Some defects have been noted at some locations--hollow heart, early sprouting, second growth. Quite susceptible to scab. Spindle tuber reported. Yield not quite as high as Sebago or Katahdin. Very high solids--24.4% average (highest in trial). Fairly good boiler and french frier; chipper; excellent baker. Tendency to darkening when boiled, chipped and fried. Fair storage quality. May merit a second year regionally.

Katahdin. Standard medium-late to late variety. Vigorous plants. Good stand usually. Long stolons in dry season--sunburning of tubers sometimes a problem. Round, smooth tubers. Smooth, white skin. Shallow eyes. Some resistance to leaf roll. Susceptible to scab and late blight. Silver scurf often severe in storage. Good yield. Medium-high solids. In 1960 a fair chipper and frier; a good boiler and very good baker. Stem-end darkening of boiled and dark color of the fried or chipped product often a problem. Stores very well. Since Sebago has become the maincrop variety in Ontario it is recommended that Katahdin as a check variety in this trial be omitted.

F 4519. Second year regionally. Matures with Katahdin. Vigorous plants but small leaves. Irregular tuber type--round to oblong. Tubers lack uniformity of shape. Smooth to flaked skin. Eyes medium deep to deep. Susceptible to scab and rhizoctonia. Tubers break dormancy readily in the ground in a hot, dry season such as 1959. Yields are similar to Sebago. At Harrow, in 1960, F 4519 outyielded Cobbler at the first harvest date--June 28. Very high solids¹ content, 23.0% average. In general culinary quality F 4519 is almost equal to F 5080 and Sebago. Very good boiler and baker; fairly good chipper; good french frier. From several locations the boiled product had a definite tendency to darken at the stem-end. Produces the best chip and french fry color of any variety in the trial. There was a small build-up of reducing sugars during 40°F. storage. Conditioning at 70°F. reduced the sugar level below that at 51°F. storage. The principle future of F 4519 would be as a processor. May merit a third year regionally but the storing quality is questionable except under controlled conditions.

Sebago. The standard maincrop variety in Ontario. Vines mature very late and tubers size relatively late in the season. Very vigorous, spreading plants. Tubers are roundish to oblong with smooth white skin and shallow eyes and are attractive in appearance. Tubers often adhere strongly to the vines. Moderately susceptible to common scab and leaf roll and also to "heat" sprouting in the soil. Yields are generally good. Solids are average. A very dependable boiler and baker--cooks very white and resists sloughing. Was a fair to fairly good chipper and french frier in the trials conducted at Smithfield. Conditioned well at 70°F. after 40°F. storage. Sprouts early in storage unless temperatures are controlled or a chemical inhibitor is used. Should be continued at the maincrop standards.

Ontario table 1. Maturity and yields of selections in the Ontario regional potato variety trials of 1960.

Variety	Yield of Canada No. 1 - Bushels per Acre											
	Maturity ¹	Ha. ²	Ri.	OAC	Du.	Br.	Sm.	Fo.	Ml.	Co.	FW	Mean
Norland	1.6	82	330	201	354	546	274	215	328	206	317	285 ¹⁵
ND 3324-2	2.5	252	405	296	352	444	334	196	467	215	317	328 ⁹
B 605-10	2.3	322	446	246	393	655	210	227	387	212	377	347 ⁴
Irish Cobbler	2.0	230	463	180	269	569	339	166	372	159	265	301 ¹³
F 5080	3.3	334	330	180	298	466	357	93	281	342	210	289 ¹⁴
F 4834	2.5	362	365	212	386	622	289	233	396	280	263	341 ⁶
F 5350	3.6	292	318	201	396	522	316	95	326	329	293	209 ¹²
Katahdin	3.7	337	375	228	387	503	464	147	431	302	352	352 ²

continued

Ontario table 1, continued.

F 4519	3.8	364	393	224	413	417	402	135	377	246	334	330 ⁸
F 4724	3.5	425	275	271	442	478	259	135	401	380	445	351 ³
F 5143	3.6	375	387	208	429	523	321	118	312	357	388	342 ⁵
F 5317	2.9	188	438	202	361	577	304	128	428	338	303	327 ¹⁰
F 5348	3.6	311	406	250	348	515	339	125	350	244	379	327 ¹⁰
F 5459	3.5	455	470	310	411	616	456	212	244	278	345	380 ¹
Sebago	4.5	313	350	211	441	500	369	91	428	257	403	336 ⁷
Mean		309	383	228	377	530	337	154	368	276	333	330
L.S.D. 5%		129	50	N.S.	54	104	--	72	71	--	48	
1%		172	68	N.S.	73	140	--	97	95	--	64	

1/ Maturity - 1 - very early; 2 - early; 3 - medium; 4 - late; 5 - very late.

2/ Ha. - Harrow; Ri. - Ridgetown; OAC - Guelph; Du. - C. Faint, Dufferin Co.; Br. - Bradford (Muckland); Sm. - Smithfield; Fo. - Fournier; Mi. - Mindemoya, Manitoulin; Co. - G. Hackett, Cochrane; FW - Fort William.

Ontario table 2. Total solids' contents of selections in the Ontario Regional Potato Variety trials of 1960.

Variety	Total Solids in Percent										Mean
	Ha.	Ri.	OAC	Du.	Br.	Sm.	Fo.	Mi.	Co.	FW	
Norland	18.7	19.2	18.5	19.8	17.5	17.0	18.1	19.0	16.2	20.0	18.4 ¹⁵
ND 3324-2	21.5	21.3	19.8	21.2	18.7	18.2	19.8	21.0	16.2	21.0	19.9 ¹³
B 605-10	20.5	20.0	21.3	20.5	19.0	17.7	19.7	21.0	17.2	22.7	19.9 ¹³
I. Cobbler	20.5	21.5	21.2	21.2	18.5	18.1	19.5	21.2	16.5	22.5	20.1 ¹²
F 5080	22.6	23.2	24.0	23.0	20.2	21.2	20.2	21.7	18.1	23.7	21.8 ⁶
F 4834	22.0	24.2	23.7	23.0	21.7	18.7	21.2	22.2	18.7	24.7	22.0 ⁴
F 5350	23.0	22.0	23.7	23.0	18.7	19.8	20.0	21.3	17.2	22.2	21.1 ⁸
Katahdin	22.2	20.7	21.7	22.0	18.5	19.2	19.5	20.0	18.5	22.0	20.4 ¹⁰
F 4519	19.7	23.2	26.0	25.1	22.5	22.2	21.3	22.7	21.3	25.7	23.0 ³
F 4724	20.7	21.0	22.6	24.7	20.5	19.2	21.3	20.5	18.5	22.5	21.2 ⁷
F 5143	22.5	21.7	24.0	24.1	21.0	20.2	19.8	21.2	20.2	24.0	21.9 ⁵
F 5317	20.5	22.2	22.2	22.0	19.2	18.5	18.2	21.5	17.2	23.0	20.4 ¹⁰
F 5348	24.7	24.4	27.0	26.2	23.0	23.0	22.7	23.5	23.5	26.3	24.4 ¹
F 5459	23.7	24.2	26.2	25.0	22.7	22.0	22.6	23.0	20.2	26.2	23.6 ²
Sebago	21.7	20.7	24.1	22.7	18.1	19.8	18.2	19.8	21.3	20.5	20.7 ⁹
Mean	21.6	22.0	23.1	22.9	19.9	19.6	20.1	21.3	18.7	23.1	21.2

Potato Adaptation Trials in the Ontario Region

Adaptation trials of potatoes were conducted at the following stations:

1. Ontario Agricultural College Potato Farm, Guelph--G. R. Johnston and R. G. Rowberry.
2. Research Developmental Unit, Canada Department of Agriculture, Fort William--W. B. Towill.

3. Experimental Farm, Canada Department of Agriculture, Smithfield--N. M. Parks.
4. Ontario Agricultural College Much Research Station, Bradford--C. Filman and M. Dickson.
5. Research Station, Canada Department of Agriculture, Harrow--L. F. Ounsworth.

Potato seedlings and varieties in these trials were mainly Fredericton-bred and selected clones (F) plus some introductions from the United States and a few Guelph selections from Fredericton-bred material (FG). In addition, the Plant Pathology Research Laboratory, Canada Department of Agriculture, St. Catharines, as a co-operator in the Ontario Potato Scab Research Committee's investigations, have produced "first" tubers in their greenhouses from Fredericton-bred "true" seed of crosses designed for scab resistance. A selected group of these clones have been given their first field test in single hills at the O.A.C. Potato Farm's scab nursery.

The majority of the clones in the Adaptation trial in Ontario have only had one year in the field in single-row plots. Many of these will not be retained after two years of data are obtained. However, some of the first-year adaptation (selected) clones appear promising. Among these are FG3420-2Ru, FG3420-5Ru, FG3427-1Ru, ND4122-2, ND3815-1R and Neb.156.52-2R.

There are four clones in the Ontario Adaptation trials which have qualified for the 1961 Ontario Regional Potato Variety Trial. There is sufficient tuber-unit increase seed on hand of all except the Fredericton-selected one (seed of which may be available from Fredericton). These are:

F 5534. Early. Strong plants. Smooth, good-sized uniform tubers with distinctly netted-type skin and medium deep eyes. Good solids' content for an early (higher than Cobbler). Very good boiler. Excellent baker.

Ia 1111-8. Late (Katahdin). Strong plants. Bright, medium-large, smooth-skinned, fairly uniform tubers with shallow eyes. Heavy set of tubers. Very high yield potential under favorable conditions and adequate soil fertility. Susceptible to leaf roll and moderately susceptible to scab. Reported immune to virus X. High solids' content. Excellent boiler and baker. Has an excellent chipping record in the Michigan over-state trials.

Blanca. Vines as late as Sebago but tubers size earlier. Very strong plants. Very smooth, clean, uniform tubers with shallow eyes and generally a flaked-type of russet skin. Resistant to scab. Susceptible to leaf roll, mosaic and blackleg. High set and high potential yield. High solids. Excellent boiler and baker although boiled tubers tend to slough. Cooked color is excellent.

Navaio. Medium maturity. Strong plants. Large, fairly uniform tubers with smooth, creamy skin. Apical eyes are often medium deep. Tubers size fairly early in season. Susceptible to scab, silver scurf and probably most viruses. Resistant to the common race of late blight. Heavy set of tubers. High potential yield. Solids comparable to Sebago. Very good boiling and baking quality although a slight tendency towards after-cooking darkening was noted in 1960 (boiled). Reported to have good chipping quality in the Colorado Trials.

Seedlings FG3289-10 (very early and scab-resistant), ND3569-1Ru (early russet) and 1961-1 (early) are the most promising of the more advanced adaptation trial clones and are being increased in 1961.

COLORADO
J. L. Weigle

Variety trials. Variety trials were planted in the same three locations again this year. No yield data was obtained because seedpiece rot caused very poor stands.

The accompanying Colorado tables show only the chip color and reducing sugars for various varieties under different storage conditions. The chip color data represent the Rd readings of a Gardner Color Difference Meter using a light yellow standardization plate which has a Rd value of 61.7. Using this scale, a Rd reading of 30 or above is considered commercially acceptable in this area. The percentages of reducing sugars were determined by Hassid's Ferricyanide Method on a dry weight basis. Data for two replications are presented in some instances to show the wide variation in results which occurs with some varieties. This would seem to indicate that either larger samples or more replications would be necessary to obtain more representative data. The size of samples used for each determination in these data was five tubers.

The results from the Gilcrest trial (Colorado Table 1) show that chip color has a considerable independence from its usual inverse correlation with percent reducing sugars in this instance. It is noted that some varieties, such as Kennebec, show an increase in percent reducing sugars along with the improvement in chip color. It is also noted that all the varieties improved greatly in color during the three months storage at room temperature while the percentage of reducing sugars did not change very much for most of the varieties. This would seem to indicate that something other than the amount of reducing sugars present was responsible for chip color in this instance. It would be well to mention here that the chip color readings obtained from the potatoes chipped at harvest were unusually dark compared to what would be expected. However, the point can still be made that percentage reducing sugars is not a good indication of chip color in freshly harvested potatoes.

In contrast to this, the Fort Collins data (Colorado Table 2) show that if the potatoes are stored at 40°F. for a period of two months or more the inverse correlation between reducing sugar percentages and chip color become much more apparent. Of course, this correlation is by no means exact; but a definite trend is noted. The two varieties which had the highest percentages of reducing sugars also had the lowest color readings. Thus, this relationship could be used to screen out at least part of the unchippable lines in a potato breeding program.

Breeding program. One phase of the breeding program has been devoted to an attempt to utilize the information presented in the other part of this report. We have been able to test more lines by just running the reducing sugar test than would have been possible if we had chipped each one. As a result, we have retained lines that would have otherwise been discarded. Although these lines lack some horticultural characteristics that prevent their use as commercial varieties, they should be of value as parent material. Using this technique, two lines have been selected which give very light colored chips directly out of 40°F. storage.

Variety	Chipped at Harvest				Stored at Room Temperature 75° - 85°F.							
	Rep I		Rep II		2 weeks storage				3 months storage			
	Rep I		Rep II		Rep III		Rep IV		3 weeks storage		3 months storage	
	Rd	%R.S.	Rd	%R.S.	Rd	%R.S.	Rd	%R.S.	Rd	%R.S.	Rd	%R.S.
Kennebec	29.8	.105	25.2	.184	23.2	.169	28.3	.173	35.3	.200	35.2	.243
Russet Rural	18.4	.169	28.1	.189	27.6	.181	21.0	.167	27.6	.174	35.4	.131
Blanca	19.4	.173	29.2	.143	27.0	.173	22.2	.148	20.9	.191	37.8	.125
Haig	27.5	.143	29.0	.119	26.8	.189	21.5	.194	23.7	.134	37.2	.118
ND 3324-2	24.0	.139	23.5	.165	27.6	.179	26.8	.177	25.2	.180	34.9	.161
Cobbler	27.2	.142	25.0	.203	25.3	.210	24.8	.301	26.6	.166	34.7	.152
M 355	31.4	.121	25.6	.179	25.3	.166	27.5	.186	31.3	.196	35.1	.158
Katahdin	28.3	.180	27.5	.153	28.1	.182	26.6	.206	24.5	.254	33.5	.138
Saco	22.8	.221	26.7	.146	20.5	.256	21.1	.184	23.9	.263	35.7	.174
Tawa	25.1	.148	27.6	.135	22.2	.122	24.5	.120	29.3	.195	34.9	.149
Fundy	21.3	.176	18.9	.168	24.5	.180	21.7	.205	24.6	.185	37.6	.145
Rushmore	28.4	.178	23.2	.203	28.2	.158	23.2	.189	30.0	.183	36.4	.134

Colorado table 2. Fort Collins Trial, Chip Color and Reducing Sugars.

Variety	Storage Temperatures													
	50°			40°			40° to 70° for 1 week			40° to 70° for 2 weeks				
	Rd	%R.S.	Rep I Rd	%R.S.	Rep II Rd	%R.S.	Rep I Rd	%R.S.	Rep II Rd	%R.S.	Rep I Rd	%R.S.		
Blanca	33.8	.104	21.1	.446	20.7	.358	24.5	.261	24.4	.199	22.1	.255	33.4	.167
Navajo	34.7	.106	17.8	.372	20.8	.292	25.6	.204	26.1	.183	36.6	.145	36.5	.160
Kennebec	34.4	.104	23.4	.307	26.8	.164	29.0	.195	32.2	.174	37.3	.160	40.5	.107
Katahdin	33.1	.104	25.7	.292	21.6	.273	24.5	.293	33.9	.134	37.5	.154	36.2	.148
Russet Rural	33.8	.139	23.5	.203	27.2	.183	31.0	.164	31.3	.148	35.1	.132	31.3	.150
Saco	27.5	.151	23.9	.360	23.9	.205	25.9	.227	28.1	.222	33.5	.129	41.8	.131
F 5080	29.2	.117	24.5	.244	27.2	.303	27.4	.235	25.4	.202	30.8	.169	31.2	.177
Rushmore	31.3	.197	23.9	.405	25.2	.240	23.4	.238	30.0	.164	29.9	.166	38.0	.130
Keswick	30.5	.199	19.3	.426	18.7	.524	11.2	.876	20.2	.377	23.2	.487	18.8	.374
Canso	31.9	.104	26.0	.270	27.5	.179	26.7	.318	32.1	.168	32.8	.159	35.2	.138
Chippewa	33.3	.157	29.2	.147	23.0	.285	38.0	.168	25.9	.232	37.4	.167	34.4	.200
ND 3324-2	32.7	.154	19.8	.431	16.3	.502	20.1	.483	19.1	.321	26.6	.187	21.9	.325
Rukat	35.1	.086	24.7	.164	23.1	.237	26.5	.159	32.8	.136	32.3	.146	32.4	.244

CONNECTICUT
Arthur Hawkins

Potato Variety tests were conducted by the Storrs Agricultural Experiment Station, Storrs, Connecticut, on two commercial potato farms in the Connecticut River Valley in 1960. Experimental procedures, total yields, yields over 1-7/8", yields over 1-7/8" with seriously off-shaped tubers removed, dry matter, chip color, and tuber observations are given in Connecticut Tables 1 and 2 with footnotes.

Yields. Excellent growing conditions occurred at the East Windsor Hill location resulting in outstanding yields especially of the Kennebec and Manota varieties, Connecticut table 1. At the other location verticillium wilt, plus fleabeetles resulted in earlier than normal death of vines. Yields of Navajo and especially Blanca were light at both locations.

Dry Matter. In averages of specific gravity readings of tubers from both locations, Blanca and 47156 had the highest dry matter content, followed by Delus, Huron, Navajo, B 69-16, Kennebec and Plymouth.

Chip Color. After grading, the tubers were stored at 50° until 12/30/60. They were then reconditioned for 30 days at 70°F. before being fried on 1/30/61. Color ratings are shown in the tables. Kennebec, 47156, Navajo, Plymouth, Delus, and Katahdin from Location 2, Conn. table 2, produced chips with color ratings good to satisfactory. Tubers of 4 varieties and seedling 47156 available for chipping on 1/30/61 from Location 1, produced chips of satisfactory color, Conn. table 1.

Tubers of the yellow-fleshed seedling 47156 from both locations reconditioned well producing good colored chips.

Small Lots of Seedlings: Of 40 USDA seedlings from Maine planted in 5-hill lots, thirteen were not harvested because of small yields or production of off-shaped tubers. Other seedlings were discarded because of tuber shape at the time of grading. Specific gravity and chip color were determined on tubers of 16 seedlings. Four of these produced good yields of tubers that reconditioned to produce chips with good to satisfactory color ratings.

Conn. table 1. Yield^{1/} and specific gravity of potato varieties and seedlings, East Windsor Hill^{2/}, Conn., 1960.

Variety ^{3/} (Spacing 9" except *)	Total yield per acre	Yield per acre, over 1 7/8"				Dry ^{5/} Matter	Chip color rating ^{6/}
		Free of serious off shape ^{4/}					
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	
Delus (6")*	300	91.4	274	91.4	274	18.6	
Huron (12")*	436	83.5	364	80.3	350	18.9	
Katahdin	361	92.3	333	91.4	330	17.0	6.6
Kennebec (8")*	507	92.8	470	89.9	456	18.0	6.1
Knik (30% mos.) ^{7/}	341 ^{7/}	74.2 ^{7/}	253	66.7 ^{7/}	227 ^{7/}	16.3	
Manota	442	90.1	398	89.1	394	17.3	
Navajo	208	84.8	176	84.8	176	17.2	
Plymouth	381	90.3	344	87.0	331	17.0	6.8
47156	326	92.8	303	90.5	295	18.2	6.0
B 69-16	342	87.7	300	85.1	291	18.4	
B 3319-30	436	84.0	366	75.4	329	16.4	
Katahdin-B seed	321	87.0	279	85.7	275	17.1	
L.S.D.					35.2		
Blanca-(single plot)	247	69.7	172	69.7	172	18.6	6.8

1/ Plots: 1 row 21 feet long. Replication: 4 in randomized blocks (3 sections x 4 rows), except only 3 replications for Katahdin B seed. Soil: Enfield silt loam, potatoes 3rd year. Fertilizer: 2000 pounds 6-8-8 in row plus 60 lbs. N sidedressed.

2/ Season and conditions: East Windsor Hill (8 miles N.E. of Hartford). Planted: May 5, 1960. Favorable season: Vines chemically killed unintentionally by late August.

3/ Seed supplied by USDA, except Navajo and Blanca from Colorado, and Katahdin certified B-size. Knik had 30% mosaic.

4/ Tuber observations (a) Shape--Delus, good shape; Manota round, shallow eye. % Irregular shaped tubers - Huron 3.2%, Kennebec 3%; Knik, 7.5% (many growth cracks); 47156, 2.3%; B69-16, 2.6%; B3319-20, 8.6%, vs. Katahdin 0.6%. (b) Green tubers - Kennebec, 1.3% vs. Katahdin 0.6% (c) Skin - Manota slightly russetty, Plymouth russetty. (d) Sprouting on 10/21/60 - Manota, several tubers sprouting; 47156, some sprouts. (e) Hollow Heart - Delus one in 40 tubers, Huron 1/40, Katahdin 4/40, Navajo 13/40, Plymouth 3/40, 47156 8/40. (f) Drought Spot - Huron 9 tubers in 40, Katahdin 2/40, Manota 1/40, Navajo 2/40, Plymouth 1/40, B 69-16 2/40.

5/ Dry Matter calculated from specific gravity. Sp. gr. by weight in air and in water. Ave. of 4 replications (10 tubers 2½" to 3" diam. per sample). Sp. Gr. 1.080 = 20.2% Dry Matter; 1.070 - 18.1%; 1.060 - 16%, using Von Scheele equation.

6/ Potatoes reconditioned for 30 days at 70°F. before fried on 1/30/61. Potatoes had been stored at 50°F. from harvest until 12/30/60. Color rating from Proposed Color Reference Standard 1/25/54 Procter and Gamble Company. Chips with readings 6.0 and 7.0 satisfactory.

7/ Knik had 30% mosaic.

Conn. table 2. Yield^{1/} and specific gravity of potato varieties and seedlings, Windsorville, Conn., 1960.

Variety or ^{3/} seedling (spacing 9" except *)	Total yield per acre	Yield per acre, over 1 7/8"					
				Free of serious off shape ^{4/}		Dry ^{5/} Matter	Chip Color ^{7/}
	cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	
Delus (6")*	203	89.2	181	88.8	180	17.0	6.4
Huron (12")*	244	79.1	193	75.3	184	16.7	9.8
Katahdin	270	91.3	247	91.2	246	15.5	6.7
Kennebec (8")*	288	90.7	261	89.7	258	15.6	<u>6.0</u>
Knik (30% mos.) ^{6/}	208	77.7	162	75.4	157	14.9	8.5
Manota	240	82.9	199	82.0	197	15.6	7.8
Navajo	232	88.8	206	88.1	204	17.3	<u>6.1</u>
Plymouth	282	86.0	243	84.4	238	16.5	<u>6.2</u>
47156	273	92.1	251	88.7	242	18.2	<u>6.0</u>
B 69-16	213	82.4	176	79.6	170	15.6	8.1
B 3319-30	288	76.8	221	70.5	203	15.2	9.7
Blanca	207	70.2	145	68.1	141	17.8	7.5
L. S. D.					20.3		

1/ Plots: 1 row 21 feet long. Replication: 4 in randomized blocks (3 sections x 4 rows). Soil: Enfield silt loam; potatoes 5th year after tobacco. Fertilizer 1300 of 10-15-15 in row plus 60 lbs. N sidedressed.

2/ Season and conditions: Windsorville (10 miles N.E. of Hartford). Planted: May 4, 1960. Following six inches of rain June 3 and 4, of which 4" fell in three hours on June 4th, season favorable. Considerable verticillium wilt showing in field by August 10. Remaining green ones practically all killed by flea beetles by 9/8/60. Vine killed 9/8/60.

3/ Seed supplied by USDA, except Blanca and Navajo which were supplied by Dr. C. W. Frutchev, Colorado State University. Knik had 30% mosaic.

4/ Tuber observations (a) Shape - Navajo flat, nice shape; Blanca round, many but small. % Irregular shaped tubers - Huron 3.8%; Kennebec 1.0%; Knik, 2.3% (few growth cracks); Manota, .9%; Plymouth, 1.6% (growth cracks); 47156, 3.4%; B 69-16, 2.8%; B 3319-30, 6.3%; Blanca 2.1%; vs. Katahdin 0.1%; B 69-16 considerable pink eye noted; 53319-30 considerably irregular, knob end heavy set, many B-size. (b) Green tubers - Huron 1.0%; Katahdin 0.8%; Kennebec 0.9%; 47156 .9%; B69-16 1.3%. (c) Skin - Manota slightly russetty; Plymouth, russetty; Blanca, russetty. (d) Sprouting - Manota, sprouts to 1" on 10/24/60. (e) Hollow Heart - Navajo 1 of 20; 47156 2 of 20.

5/ Dry Matter calculated from specific gravity. Sp. gr. by weight in air and in water. Ave. of 4 replications (10 tubers 2½" to 3" diam. per sample). Sp. Gr. 1.080 = 20.2% Dry Matter; 1.070 - 18.1; 1.060 - 16%, using Von Scheele equation.

6/ Knik had 30% mosaic.

7/ Stored at 50°F. until 12/30/61. Temperature then raised to 70°F. for 30 days until fried 1/30/61. Proposed Color Reference Standard 1/25/54 Procter and Gamble Company. Chip with readings 6.0 and 7.0 satisfactory.

DELAWARE
E. P. Brasher

Yield and solids tests were conducted on 16 varieties and seedlings in 1960. The experimental conditions and procedure were as follows: location, Substation Farm, Georgetown; soil, Norfolk sandy loam; plot design, randomize block; replications, four; plot size, 3 by 24 feet; spacing in row, eight inches; fertilizer, 2000 pounds of 10-10-10 per acre in bands at planting time; irrigation, when soil moisture dropped to 50 percent available; fungicide, Zineb; and insecticide, DDT. The results are shown in Delaware table 1.

A newly named variety, Redskin (B 2368-4), was easily the most productive variety in the test. It produced a record yield for Delaware. The varieties and seedlings with the highest solids were B 3172-13, B 3453-2 and Delus.

Delaware table 1. Yield and solids tests of varieties and seedlings, Georgetown, Delaware, 1960.

Variety	Yield per acre		U.S. No. 1	Solids
	U.S. No. 1	Total		
	Cwt.	Cwt.	Pct.	Pct.
Redskin (B 2368-4)	509	576	88	14.3
Katahdin	390	431	90	12.8
B 3453-2	387	453	85	15.8
Onaway	379	437	87	12.8
Pungo	379	427	89	15.3
B 3424-11	313	374	84	15.3
B 3352-8	304	410	74	12.8
Delus	281	311	90	15.5
B 3309-4	281	369	76	12.1
B 3140-36	278	353	79	14.3
B 3428-41	260	321	81	15.3
B 3427-7	213	307	69	13.8
Redbake	212	274	77	14.0
Navajo	208	265	78	15.0
B 3454-14	182	237	77	13.8
B 3172-13	166	278	60	16.0
L.S.D. 5%	43	41	--	.16
L.S.D. 1%	57	54	--	.21

FLORIDA (Hastings)

A. H. Eddins

Few reports of corky ringspot damage to potatoes in the Hastings area were received in 1960. This disease is sporadic in occurrence. A field may be almost free of the disease for one or more seasons and then be very severely affected another season. In some fields it is more generally distributed and causes losses every year varying from 5 to 10 percent to 50 to 75 percent or more in susceptible Sebago. On the Potato Investigations Laboratory farm, corky ringspot has been severe for several years in an area used for testing varieties for resistance to the disease. For example infection in the susceptible Sebago averaged 33.2 percent in the varietal plots in 1959 and 37.5 percent in 1960.

Seven numbered USDA seedlings and nine varieties were tested for their reaction to corky ringspot in 1960. The potatoes were planted in replicated plots December 29, 1959 and dug, graded and examined for corky ringspot infection May 2, 1960. All US 1A and 1B size tubers were sorted for corky ringspot and the number and weight of infected and noninfected tubers in each plot were recorded. Data on each seedling and variety are recorded in Florida table 1.

No symptoms of corky ringspot were observed in tubers of B 294-65, B 313-21, B 606-3, B 721-1, B 3725-1, TL 1859, Delus, Merrimack, Plymouth, Pungo and Saco. Average percentage tuber infection by weight in other entries were as follows: B 962-9, 6.2%; White Rose, 19.3%; Catoosa, 5.4%; Red Pontiac, 4.7% and Sebago, 37.5%.

Most of the varieties and seedlings tested for corky ringspot resistance in 1960 have been tested previously. Their reaction to the disease during the ten-year period 1951-60 in the years they were grown is reported in Florida table 2. Four seedlings, B 294-65, B 313-21, B 606-3, TL 1859 and Delus did not develop the disease in the two to ten years they were tested. Tuber infection in B 721-1, B 962-9, Merrimack, Plymouth, Pungo and Saco did not exceed seven percent by weight, most of them showed less than one percent tuber infection. Maximum percent infection in the most susceptible varieties, White Rose, Catoosa, Red Pontiac, and Sebago ranged from 5.4 to 74.0 percent, Sebago and Red Pontiac were the most susceptible.

Florida table 1. Reaction of potato seedling selections and varieties to corky ringspot when grown in replicated plots of infected soil in 1960.*

Variety or Selection	Tubers					
	Number	Percent Infection		Pounds	Percent Infection	
		Average	Range		Average	Range
B 294-65	163	none	none	24.3	none	none
B 313-21	216	none	none	49.9	none	none
B 606-3	261	none	none	42.7	none	none
B 721-1	259	none	none	48.4	none	none
B 962-9	245	5.3	0-30.8	32.1	6.2	0-29.4

continued

Florida table 1, continued.

B 3725-1	308	none	none	64.6	none	none
TL 1859	349	none	none	73.4	none	none
Delus	284	none	none	57.5	none	none
Merrimack	379	none	none	80.8	none	none
Plymouth	254	none	none	69.5	none	none
Pungo	347	none	none	68.4	none	none
Saco	281	none	none	50.0	none	none
White Rose	280	19.3	0-63.2	62.8	19.3	0-59.4
Catoosa	369	5.7	0-35.0	55.6	5.4	0-33.3
Red Pontiac	398	5.1	0-45.5	71.8	4.7	0-54.7
Sebago	338	34.0	0-68.8	69.7	37.5	0-72.4

*Potatoes planted 12-29-59 in 10-hill plots replicated 7 times. Tubers dug and examined for corky ringspot symptoms May 2 and 3, 1960.

Florida table 2. Reaction of potato varieties and seedling selections to corky ringspot from 1951 to 1960.

Variety or Selection	Percent Tubers with Corky Ringspot Symptoms				Number Years Tested
	1951-58	1959	1960	Range in Percentage Tubers Affected	
B 294-65	none	none	none	none	10
B 313-21	none	none	none	none	8
B 606-3	none	none	none	none	10
B 721-1	none	0.5	none	0--0.5	8
B 962-9	0.8 one year	0.7	6.2	0--6.2	9
TL 1859	-	none	none	none	2
Delus	none	none	none	none	5
Merrimack	0.3 one year	none	none	0--0.3	9
Plymouth	7.0 one year	none	none	0--7.0	10
Pungo	0.4 one year	none	none	0--0.4	8
Saco	0.2 one year	none	none	0--0.2	6
White Rose	0.4 one year	0.7	19.3	0-19.3	3
Catoosa	-	-	5.4	5.4	1
Red Pontiac	0-69.1 five years	27.0	6.5	0-69.1	7
Sebago	0-74.0 eight years	33.2	37.5	0-74.0	10

Potato Variety and Seedling Selection Trials in 1960

E. N. McCubbin and A. H. Eddins

Replicated Variety Yield Test. In 1960, 26 named varieties and 22 seedling selections were grown and compared for yield and their tuber characteristics at the Potato Investigations Laboratory. Seed of most of these varieties and selections were obtained from A. E. Schark, Presque Isle, Maine; R. V. Akeley, Beltsville, Maryland; and T. P. Dykstra, Baton Rouge, Louisiana; all working in the National Potato-Breeding Program. Seed of a dozen or more stocks also were obtained from the Nebraska and the North Dakota Agricultural Experiment Stations.

Experimental: Location, Hastings, Florida; soil, recently-cleared leveled Ona fine sand; plot size, single row 8.6 feet long and 40 inches apart; seed spacing, 8 inches; plot design, randomized block; planting date January 21, 1960; fertilizer 2,400 pounds of 7-9-9 per acre in bands; fungicide, manzate and insecticide, endrin; harvest date May 16, 1960--117 days after planting.

The growing season was abnormally cold during January, February and the first half of March. Potato plants were frozen to the ground level 2 or 3 times before favorable growing conditions occurred the latter part of March. A deluge of 7.08 inches of rainfall during mid-March leached considerable plant nutrients from the root zone and lowered yields of potatoes. Potato plants frozen to the ground level branched and produced 4 to 6 stems per hill.

Three white seedlings, TL 2988, B 3725-1 and B 3692-4 and one red one B 2368-4 (Redskin), significantly outyielded Sebago, the standard white variety at Hastings, Florida table 3. None of these selections or any of the other varieties and selections tested produced tubers which excelled Sebago in smoothness of the tubers or their chipping and market quality.

Six white varieties, Saco, Teton, Fundy, Pungo, Plymouth and Manota, and five red ones, Dazoc, Red LaSoda, Norland, Catoosa and Redburt, as well as two white seedlings, B 3602-4, and B 4160-1, and one red one, TL 6894, outyielded Sebago but differences in yield were not significant.

Recovery From Freezing Damage. Most of the potato varieties and seedling selections in the above test as well as a few others were included in this planting. It was conducted much the same way as was the above trial, except that only 10 two-ounce seed pieces of each variety or selection were used and they were planted December 30, 1959. The ten seed pieces were planted in the row and after a skip of three feet followed by the next lot of ten seed pieces. This was continued until all lots were planted. Two rows about 300 feet long were used and seed pieces were spaced one foot apart in the row.

This planting was dug May 9, 1960--130 days after planting and the yield of US 1A and US 1B tubers ranged from an average of .35 to 2.07 pounds per hill. Thirty-one potato varieties and seedling selections recovered from the frost damage and produced yields that averaged one pound or more per hill, Florida table 4. Highest yielders were Redburt, B 2368-4 (Redskin), B 4160-1, and Pungo. These results continue to show, as did those obtained in 1957, 1958 and 1959, that potato varieties and seedlings do possess considerable ability or inability to recover from freeze damage and produce a crop of potatoes.

Florida table 3. Yields of 26 potato varieties and 22 seedling selections grown at Hastings, Florida in 1960. Planted 1/21/60.^{1/}

Variety or Seedling	100-Pound Sacks per Acre			Percent US 1A	Color of Tubers
	US 1A	US 1B	US 1A + US 1B		
TL 2988	312.8	21.7	334.5	93.5	White
B 3725-1	302.9	22.9	325.8	93.0	White
B 3692-4	291.0	56.9	347.9	83.6	White
B 2368-4(Redskin	286.0	48.8	334.8	85.4	Red
Saco	267.1	25.0	292.1	91.5	White
Teton	266.6	25.8	292.4	91.2	White
Fundy	264.0	30.2	294.2	89.7	White
Pungo	261.1	30.5	291.6	89.5	White
Dazoc	249.2	33.4	282.6	88.2	Red
Red LaSoda	235.2	26.7	261.9	89.8	Red
B 3602-4	229.1	54.3	283.4	80.8	White
Plymouth	224.2	27.3	251.5	89.1	White
Norland	222.2	40.9	263.1	84.4	Red
Catoosa	217.8	96.7	314.5	69.3	Red
TL 6894	216.6	34.3	250.9	86.3	Red
Redburt	211.4	38.0	249.4	84.7	Red
B 4160-1	206.2	38.6	244.8	84.2	White
Manota	206.2	20.9	227.1	90.8	White
Sebago	205.3	50.5	255.8	80.2	White
B 2858-5	202.1	47.3	249.4	81.0	White
TL 6937	200.7	29.9	230.6	87.0	White
B 605-10	198.1	14.8	212.9	93.0	White
B 2187-25	192.0	33.1	225.1	85.3	White
4 QV 30	190.8	26.7	217.5	87.7	White
Redbake	188.8	28.4	217.2	86.9	Red
X 792-94	188.5	39.5	228.0	82.7	White
Haig	188.2	40.3	228.5	75.0	White
Excel	187.9	38.9	226.8	82.8	Red
Nordak	185.9	40.9	226.8	82.0	White
Norgleam	183.8	27.9	211.7	86.8	White
Onaway	183.0	19.2	202.2	90.5	White
Merrimack	182.1	21.2	203.3	89.6	White
Chisago	174.5	27.9	202.4	86.2	White
B 3391-2	169.3	36.0	205.3	82.5	White
4 SL 2	168.4	24.4	192.8	87.3	White
TL 6543	164.0	43.9	207.9	78.9	White
Bounty	162.6	47.0	209.6	77.6	Red
Blanca	155.9	54.3	210.2	74.2	White
Tawa	148.4	20.9	169.3	87.7	White
Progress	143.7	68.0	211.7	67.9	Red
WC 41956	135.0	54.0	189.0	71.4	White
Osage	129.5	50.2	179.7	72.1	White
B 2938-22	126.9	36.9	163.8	77.5	White
Knik	113.6	41.8	155.4	73.1	White
B 3626-13	104.5	44.7	149.2	70.0	White
B 3726-6	94.7	25.2	119.9	78.9	White
TL 6945	61.9	59.5	121.4	51.0	White
B 3428-20	45.3	3.5	48.8	92.9	White
LSD	19:1 64.4	20.8	61.2		
	99:1 84.9	27.5	80.7		

^{1/} Based on yields from 8.6-foot single row plots replicated 5 times; seed-pieces planted 8 inches apart in rows 40 inches apart. Dug May 16, 1960 - 117 days after planting.

Florida table 4. Recovery from frost injury, yield and color of tuber surface from 52 potato varieties and seedling selections grown at Hastings, Florida in 1960. Planted 12/30/59.^{1/}

Variety or Seedling	Rank	Weight			Percent US 1A	Number Tubers	Average Weight per Tuber	Color of Tuber
		US	1A & UA	1B				
Redburt	1		20.7		83.6	97	.213	Red
B 2368-4 (Redskin)	2		20.1		88.1	91	.221	Red
B 4160-1	3		18.6		83.3	84	.221	White
Pungo	4		17.8		83.2	79	.225	White
B 3677-1	4		17.8		86.5	82	.217	White
Red LaSoda	5		16.9		90.5	69	.245	Red
Catoosa	5		16.9		69.8	100	.169	Red
Saco	6		16.3		75.5	76	.214	White
Teton	7		15.4		75.3	83	.186	White
Bounty	8		15.3		79.7	80	.191	Red
Sebago	8		15.3		75.2	74	.207	White
TL 2988	9		15.2		91.5	67	.227	White
B 3602-4	10		14.9		79.2	80	.186	White
Merrimack	11		14.8		87.8	56	.264	White
B 3725-1	12		14.1		90.1	60	.235	White
TL 6543	13		14.0		62.9	90	.156	White
Redbake	14		13.7		84.7	66	.207	Red
B 605-10	14		13.7		81.0	71	.193	White
TL 6894	15		13.4		87.3	63	.213	Red
Tawa	16		13.1		86.3	63	.208	White
Excel	17		12.7		67.7	73	.174	Red
Onaway	17		12.7		85.8	53	.240	White
Knik	18		12.6		73.8	67	.188	White
Manota	18		12.6		52.4	79	.159	White
B 2858-5	19		12.3		68.3	73	.165	White
Plymouth	20		12.2		85.3	52	.235	White
Dazoc	21		11.4		68.4	68	.168	Red
Norland	21		11.4		63.2	66	.173	Red
Osage	22		11.3		96.5	44	.257	White
Progress	23		10.2		44.1	78	.131	Red
B 3692-4	23		10.2		62.8	60	.170	White
4 QV 30	24		9.8		78.6	52	.188	White
Fundy	25		9.5		67.4	53	.179	White
B 2187-25	26		9.0		61.1	58	.155	White
White Rose	27		8.9		74.2	46	.193	White
Blanca	28		8.8		45.5	61	.144	White
4 SL 2	29		8.5		71.8	39	.218	White
B 792-94	30		8.4		48.8	61	.138	White
B 3556-11	31		8.2		76.8	49	.167	White
WC 41956	32		8.1		64.2	55	.147	White
Norgleam	33		7.9		77.2	47	.168	White
B 3726-6	34		7.8		50.0	60	.130	White
TL 6937	35		7.6		69.7	37	.205	White
Chisago	36		7.3		67.1	39	.187	White
Nordak	37		7.1		80.3	43	.165	White
TL 6937	38		6.6		63.6	39	.169	White
B 2938-22	39		6.4		62.5	45	.142	White
Haig	40		6.3		50.8	44	.143	White
B 3391-2	41		4.7		31.9	40	.118	White
B 3428-20	42		4.0		15.0	36	.111	White
B 3626-13	43		3.7		46.0	28	.132	White
TL 6945	44		3.5		42.9	23	.152	White

^{1/} Based on yields from 10 seedpieces planted 1 foot apart in rows 40 inches apart. Dug 5/9/60--130 days after planting.

GEORGIA
J. E. Bailey

In 1960, cooperative potato yield trials with the U. S. Department of Agriculture were conducted in the mountain area of Georgia. The yields (Georgia table 1) did not equal those obtained in 1959 due to a very dry growing season. Only 8.3 inches of rainfall was recorded from planting to harvesting time (April 8 to August 1). One irrigation during the season helped the overall yield somewhat. The total solids data was determined August 1 by Dr. J. G. Woodroof of the Food Processing Division at the Georgia Experiment Station.

Georgia table 1. Potato variety test, Blairsville, Georgia, 1960.

Variety	Yield per acre			Total solids
	No. 1	No. 2	Total	
	Bu.	Bu.	Bu.	Pct.
Antigo	223	11	234	15.8
B 73-3	278	26	304	20.5
B 605-10	319	21	340	19.9
B 3299-13	308	31	339	17.1
B 2187-25	229	30	259	16.0
B 137-5	122	24	146	17.5
Cherokee	333	21	354	19.7
Chippewa	339	31	370	16.2
Cobbler	311	28	339	16.5
Delus	223	15	238	18.4
Huinkel	298	24	322	17.3
Kennebec	334	20	354	18.4
Knik	161	62	222	16.7
Merrimack	311	26	337	20.1
Onaway	291	16	307	15.8
Plymouth	272	13	285	19.7
Pontiac	421	26	448	18.4
Pungo	306	18	324	20.1
Red Beauty	160	16	176	16.9
Redburt	280	23	303	14.8
Rushmore	216	32	249	16.9
Saco	287	24	311	19.2
Sequoia	198	19	217	19.7

HAWAII
J. C. Gilbert

Observational Trial of Potato Lines at Kamuela, Hawaii

Fourteen potato lines, comprising 3 pounds of seed tubers each, were received from Beltsville and were planted at Kamuela, Hawaii, April 16, 1960. No sprays were applied to control late blight or other foliage diseases. High humidity and frequent rains have made potato production hazardous in this area although soil and temperature factors are favorable. Late blight has been so serious that earlier efforts to grow Kennebec by the largest ranch in that district ended in failure.

The following notes were made on this small, unsprayed plot on June 16, 1960 (2 months after planting).

Saco. No blight immune plants but some are more severely defoliated than others. Lesions occur on stems as well as leaves but variety is earlier than some others and was not exceeded in yield by any others in this trial. Tubers were smooth and white.

B-2368-4. Some late blight lesions now (2 months after planting) but only the older leaves are all dead. Late blight is coming in faster than on the Plymouth variety nearby but no stem lesions observed when green leaves remain on the stem. Tubers are fair size, pink color, but with deep eyes. Yield equal to Saco and ranks at top of the trial in this respect.

B-607-56. Lower leaves defoliated but no stem lesions. Plants vary in severity of defoliation but yield of tubers was equal to Saco and therefore at the top of this trial.

Early Gem. All plants had defoliated and died by this date but had produced an early yield of tubers which equaled that of Saco and the other heaviest yielding clones.

Onaway. Mostly defoliated by this date with late blight symptoms on remaining leaves and stem tips. Does not appear very resistant but still produced a tuber yield nearly equal to Saco before the leaves died.

Plymouth. Very little defoliation at this date. A few Alternaria spots on the leaves. Fair size tubers with a yield slightly lower than Saco and Early Gem.

B-605-10. Partly defoliated at this date, but lower leaves only. Fair sized short, rounded, white tubers. Yield about the same as Plymouth.

Boone. Late line with dark green foliage. Small tubers at this date. Late blight lesions just beginning to appear in large spots on a few of the leaves. Final yield similar to Plymouth.

Pungo. Older leaves dying off but no stem lesions. Many healthy leaves remain at this date. Very few late blight lesions showing on the green leaves. Good sized, smooth white tubers with fairly shallow eyes.

No information on comparative yields was received on the following. A neighbor's horse invaded the plot and bit off the tops of the plants but the following notes on the leaves were obtained before this happened.

Merrimack. Produced very healthy appearing dark green foliage, fair sized tubers but they showed deep eyes. Some fruit set occurred on this clone.

Tawa. Appeared quite susceptible but early maturity may be responsible for greater defoliation of the clone at this date.

Delus. Plants do not have much resistance here. Tubers resemble Kennebec.

Kennebec and Cherokee. Both of these lines are susceptible to strains of late blight at Kamuela.

IDAHO (Aberdeen)

W. M. Iritani

The variety trials for 1960 were conducted at three locations in Idaho. Reports from only two of them are presented here.

Aberdeen: The trial was conducted on a field which had grain the previous year. Fourteen varieties, three early and eleven late, were planted in plots 25 x 3 feet, replicated seven times in randomized complete block design. The early varieties were in a separate trial to facilitate early harvest. The seedpieces were spaced approximately twelve inches apart. Fertilizer was sidedressed at the time of planting at a rate of 300 pounds per acre of 16:20:0. Stand count was taken on June 18, 1960. Early dying (*Verticillium* wilt) readings were taken on August 19, 1960. Early potatoes were harvested on September 10 and later varieties on October 12, 1960.

Lewiston: Eleven varieties of potatoes were planted on April 26. There were seven replicates of each variety, with each row constituting a block and guard rows on each side. Plots were 24 feet long with rows 39 inches apart and seed pieces 1 foot apart in the row. This was as close as our planting equipment would permit. The soil involved is a silt loam. A heavy cover crop of annual sweet clover was plowed under in July of 1959. From 60 to 75 pounds of nitrogen and about 50 pounds of phosphorus were broadcast and disked under prior to planting. Irrigation was practiced as needed throughout the season, but rains during August and September satisfied most of the needs. Since heavy vine growth remained green on many of the varieties, the vines were sprayed with ammonium sulfate solution, 1 pound per gallon of water about 10 days before harvesting on October 1.

Extremely high day temperatures during July probably contributed considerably to the incidence of rough potatoes. Tubers were also formed at several places along a stolon, reducing size somewhat. In some varieties, considerable hollow heart showed up in the larger tubers.

Results

Aberdeen: The yields at Aberdeen were much lower than normal mainly due to poor soil conditions where the plots were located. Poor stand was also obtained on some of the varieties, therefore, no attempt was made to statistically analyze the data, although the experiment was designed for it. Poor stands were obtained on Merrimack, Delus and A177-54 as shown in Idaho table 1. Although Russet Burbank had a good stand it yielded very poorly. High percentage of No. 1's were obtained from seedling A175-7, Blanca, Navajo, Irish Cobbler and Plymouth.

The early dying (*Verticillium* Wilt) readings are confounded with earliness. However, the readings taken on August 19 showed that seedling A175-7 and Menominee to be highly resistant to *Verticillium* wilt.

The processing industry is interested in a variety which has a narrow specific gravity range. This was determined for the varieties by separations in brine solutions which ranged from 1.075 to 1.090. Although the average specific gravity for Blanca was quite high, table 2, the range was quite wide. Approximately 14 percent was below 1.075 and 20 percent of the potatoes exceeded 1.090 in specific gravity. Plymouth and Irish Cobbler also tended to have wide specific gravity distributions.

Lewiston: The yields for the various varieties obtained at the two locations were quite different. The Lewiston area in northern Idaho has quite high temperatures during the summer and a much longer growing season than does Aberdeen which would account for the rather high yields. Along with the high yields at Lewiston (Idaho table 3) were many rough tubers as indicated by the low percentage of No. 1's. Plymouth had a very strong tendency to hollow heart. The specific gravities were all surprisingly high. They were all higher than Russet Burbank except seedlings 170-9, 175-7 and Plymouth.

Evaluation of Processing Characteristics

Due to the vast expansion of the processing industry in Idaho, the varieties in the 1959 trials were sent to several different processors for evaluation. The results were not obtained in time for the 1959 report, therefore, they are included here in Idaho table 4.

The specific gravities taken by processors 1 and 2 were compared to those taken at Aberdeen. All of them were quite close except for Blanca taken by processor 2, which was astray from the other two readings. As for texture, processor 2 evaluated seedling A175-7 as very wet. Presumably this was determined by observing boiled potatoes. Processor 1 evaluated texture of the granules in comparison to the normal plant product which was rated as acceptable by production standards. Their results indicate seedling A170-9 as being the poorest. Menominee was rated as being 100 percent better than the plant control. However, according to dry reflectance readings which provides an objective method of measuring color of the granules, Menominee was rated as having the poorest granule color. Frying characteristics as determined by processor 1, rated A177-54 and A170-9 as being good for French fries. Menominee was rated very good in frying characteristics. The others along with Russet Burbank, were rated as satisfactory.

Idaho table 1. Potato variety trials, Aberdeen, 1960.

Variety	Yield per acre			Ave. plot stand	Early dying Readings **
	Total	U.S.No.1's	U.S.No.1's		
	Cwt.	Cwt.	Pct.	No.	Pct.
A 177-54	130	25	19.2	17.0	18.4
A 170-9	218	110	50.4	23.4	14.0
A 175-7	203	147	72.4	21.1	7.0
Blanca	177	130	73.4	20.5	16.3
Menominee	248	160	64.5	22.1	5.0
Kennebec	190	95	50.0	21.0	61.6
Russet Burbank	129	49	37.9	23.2	49.1
Navajo	184	132	71.7	22.7	26.7
Merrimack	130	84	64.6	13.6	18.4
Delus	26	17	65.3	8.6	65.4
Irish Cobbler *	185	149	80.5	22.8	75.5
Plymouth *	144	101	70.1	20.3	64.9
Early Gem *	151	85	56.2	22.4	92.8

* Early varieties harvested separately

** Percent of dead vines at time of readings

Idaho table 2. Percent No. 1 tubers (of approximately 85 pounds of potatoes) in various specific gravity classes. Aberdeen, 1960.

Specific Gravity class	A177-54	A170-9	A175-7	Blanca	Menominee	Kennebec	Russet Burbank
>1.075	9.3	5.9	11.4	13.8	1.7	45.7	22.2
1.075 - 1.080	14.6	6.9	31.7	16.7	5.4	27.6	27.1
1.080 - 1.085	20.6	32.0	33.9	23.3	16.1	22.8	33.0
1.085 - 1.090	27.4	22.6	19.7	26.4	24.7	3.2	14.4
<1.090	28.1	32.6	3.2	19.8	52.1	0.6	3.4
Average specific gravity	1.087	1.088	1.083	1.086	1.091	1.079	1.083

Specific Gravity class	Navajo	Saco	Merrimack	Irish Cobbler	Plymouth	Early Gem
>1.075	7.4	7.2	5.1	13.9	10.7	73.1
1.075 - 1.080	12.7	13.5	11.3	21.6	20.1	17.7
1.080 - 1.085	31.0	33.9	21.7	31.3	36.2	6.7
1.085 - 1.090	36.4	26.2	32.6	24.3	20.6	1.8
<1.090	12.6	19.2	23.9	8.8	12.3	.7
Average specific gravity	1.087	1.087	1.088	1.084	1.085	1.077

Idaho table 3. Data on 11 varieties of potatoes grown at Lewiston, Idaho, 1960.

Variety	Yield per acre		U.S.No.1	U.S.No.1	Specific Gravity
	Total				
	Cwt.	Cwt.	Pct.		
Merrimack	460.0	145.8	31.6		1.092
Navajo	302.1	96.1	31.8		1.091
Menominee	286.4	95.5	33.3		1.091
A 177-54	520.4	242.9	46.7		1.100
Saco	541.1	101.1	18.7		1.091
Kennebec	581.3	228.4	39.3		1.089
Blanca	395.9	168.7	42.6		1.097
A170-9	452.3	122.3	27.0		1.086
Plymouth	417.7	278.7	66.7		1.085
A175-7	479.7	208.9	43.5		1.083
Russet Burbank	538.9	197.7	45.9		1.087
L.S.D. at 5%	73.7	44.2			.008

Idaho table 4. Results obtained from two different processors on varieties grown at Aberdeen, 1959.

Variety	Specific Gravity		Pct. Reducing Sugar Processor 1	Processor 2	Texture <u>1/</u> Processor 1		Frying Characteristics Processor 2	<u>2/</u> Dry Reflectance		
	Aberdeen	Processor 1			Processor 2	Better than			Equal to	Poorer than
Al175-7	1.086	1.084	1.083	1.4	Very wet	25%	50%	Fairly even, sat.	<u>3/</u> 79.5	
Al177-54	1.090	1.091	1.093	---	Fairly dry	50%	50%	Even, good	81.0	
Al170-9	1.087	1.087	1.088	0.5	Fairly dry	--	50%	Even, good	82.0	
Russet										
Burbank	1.085	1.085	1.084	1.3	Fairly dry	75%	25%	Fairly even, sat.	82.0	
Menominee	1.088	1.091	1.090	1.6	Slightly wet	100%	--	Very even, v. good	79.0	
Kennebec	1.087	1.086	1.085	1.0	Wet	--	75%	Fairly even, sat.	81.5	
Blanca	1.089	1.090	1.082	1.4	Fairly dry	75%	25%	Fairly even, sat.	80.0	

1/ Evaluation by four panel members in comparison to plant product (control which was rated as acceptable).

2/ Higher readings indicate better color of granules.

3/ Sat. = satisfactory.

INDIANA
Clare Harris

Eleven lines from 1958 selections were put in twenty-five hill performance tests at the Purdue Muck Crops Farm at Walkerton in 1960. All lines were also increased in northern Wisconsin. Based on the results of these tests, six lines were saved for further evaluation. The cross Wis. 0112.51 x 1911-7 has produced lines high in dry matter with good yielding ability.

Two thousand seedlings from fifteen crosses made in 1958 were planted at the Muck Crops Farm in 1960. Fifty-one selections were made from progeny of eleven crosses.

Results of a 1960 variety trial conducted on sandy loam soil at Vincennes, Indiana are presented in Indiana tables 1 and 2. Potatoes were planted on April 6, about two weeks late for the area due to late snow and cold weather. The 20-foot single-row plots were spaced 36 inches apart with a 10-inch seed piece spacing in the row. Of the four replications, two were harvested on July 8 and two on July 30.

Results of a variety trial planted on May 14 at the Muck Crops Farm are presented in Indiana table 3. Except for a 12-inch seed piece spacing, the design was identical with the Vincennes trial. Some of the seed suffered freezing injury in transit and a poor stand in the affected lines resulted. The harvest date was September 30.

The growing season was better than average with adequate rainfall and cooler than normal temperatures at both locations.

Indiana table 1. Data for early harvest date of potato variety trial, Vincennes, Indiana, 1960^{1/}

Variety	Color	Total yield per acre	Maturity	Specific gravity ^{2/}	Chip color ^{3/}
		Cwt.			
F 29	white	301	M-L	66	48.2
Norland	red	283	VE	62	59.8
156 51-2	white	283	M-L	83	53.3
Dazoc	red	269	E	72	54.0
Antigo	white	263	M	69	55.9
P 5	red	252	E	65	50.3
Pungo	white	251	L	76	59.6
Kennebec	white	240	L	70	54.5
ND 3324-2	white	238	M-L	72	55.3
Keswick	white	236	L	73	52.0
Haig	white	231	M	70	60.0
Cobbler	white	220	E	75	51.2
P 7	red	218	M-L	73	57.8
Sebago	white	201	M-L	58	57.5
R. Sebago	white	196	L	63	54.9
Tawa	white	192	E	68	53.9
I 1089	white	191	E	69	61.1

continued

Indiana table 1, continued.

Cherokee	white	185	M-L	72	51.6
Boone	white	178	L	55	53.9
R. Rural	white	160	M-L	66	48.2
Merrimack	white	145	M-L	68	52.7
L.S.D. 5%		63			

1/ Based on two replications harvested 7/8/60, chipped 7/11/60.

2/ Coded by multiplying actual value by 1000 and subtracting 1000.

3/ Color difference meter readings. Chips with 55 or above are generally acceptable.

Indiana table 2. Data for late harvest date of potato variety trial, Vincennes, Indiana, 1960^{1/}

Variety	Total yield per acre Cwt.	Specific gravity ^{2/}	Chip color ^{3/}
F 29	397	67	55.0
Kennebec	394	64	59.4
Keswick	383	78	53.7
Pungo	367	76	61.1
Antigo	347	74	59.5
ND 3324-2	321	74	59.3
R. Rural	321	69	55.9
P 7	318	74	57.3
Cobbler	294	75	56.9
P 5	292	59	56.9
156 51-2	285	95	58.3
Haig	281	73	56.3
Norland	274	60	58.0
I 1089	274	66	57.1
Boone	270	55	57.2
Sebago	270	65	57.3
Dazoc	267	78	56.1
Tawa	267	77	60.7
R. Sebago	254	63	-
Merrimack	249	76	-
Cherokee	243	73	-
L.S.D. 5%		65	

1/ Based on two replications harvested 7/30/60, chipped 8/1/60

2/ Coded by multiplying actual value by 1000 and subtracting 1000

3/ Color difference meter readings. Chips with 55 or above are generally acceptable.

Indiana table 3. Yield, maturity, specific gravity, scab susceptibility, and stand of advance potato selections grown at Walkerton, Indiana, 1960.

Variety	Yield	"A"Size	Maturity	Specific ^{1/}	Area	Type	Stand, Hills ^{2/}
	per acre Cwt.	Pct.		gravity			per plot
I 1037-1	659	96.3	M	61	1	2	20.0
ND 2555-12	624	96.5	E	56	2	3	19.7
Katahdin	570	94.4	M	63	1	1	20.0
I 1346 B-3	567	96.7	E	67	1	2	19.7
I 911-7	536	94.5	M	62	2	4	19.7
Sebago	505	93.2	L	60	2	2	15.7
2475-8	502	92.7	M	62	1	3	19.0
Antigo	502	95.5	ME	61	2	2	17.0
ND 2911-1	489	92.4	M	57	3	4	19.5
Russet Burbank	480	84.2	M	68	none	none	19.3
I 1089	466	95.7	ME	64	2	3	18.7
Russet Sebago	450	91.5	L	57	1	2	15.0
P 17-2	431	93.5	M	57	2	5	19.5
I 1346 B-8	394	80.6	VE	63	1	2	19.7
Tawa	205	90.8	ME	62	3	3	8.3

L.S.D. 1% 136

L.S.D. 5% 101

C.V. = 14.4%

^{1/}Coded by multiplying actual value by 1000 and subtracting 1000.

^{2/}The poor stand in some lines was a result of freezing injury to the seed potatoes in transit.

IOWA

L. L. Sanford, J. C. Horton, R. Borgman, E. T. Hibbs,
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Seed and Seedling Production. Crosses for the potato program are made in the greenhouse from February to April. By using artificial lights and heat controls we can duplicate field conditions of temperature and light. Both blooming and seed set are exceptionally good. Parents were selected and crosses made based upon the following objectives in the order given: (1) High yields, (2) High quality (interior color, high solids, texture, etc.), (3) Scab resistance, (4) Other diseases.

Crosses made in the greenhouse included resistance to scab, late blight, virus X, leaf roll, verticillium wilt, ring rot, virus A and virus Y. Seed production was excellent and a total of 65 combinations were made.

A total of 9127 seedlings representing 73 different combinations were grown at Clear Lake. From these 245 selections were made for further testing.

Increase Plots. The increase plots were grown at Rhinelander, Wisconsin, in 1960 in cooperation with University of Wisconsin Agricultural Experiment Station. A total of 685 lines were planted and after rigorous selection, 446 lines were harvested. Each of the 446 lines and this year's single hill selections are being indexed at Homestead, Florida. Any tuber that is questionable will be discarded. This procedure is necessary for maintaining disease-free stock for distribution and further increase. The results of indexing in Florida and increasing in Wisconsin are apparent and are summarized in Iowa table 1.

Iowa table 1. Summary of Florida index program.

	Emerged	Not Emerged	Leaf Roll	Mosaic	Spindle Tuber	Varietal Mixture	Discard	OK
1957-58	2612	771	189	59	221	25	350	997
Florida Index	.	(29.5) ^a	(7.2)	(2.2)	(8.5)	(1)	(13.4)	(38.2)
1958-59	2851	446	688	105	64	20	--	1974
Florida Index	(15.6)	(24.1)	(3.7)	(2.2)	(1)			(53.4)
1959-60	666	1049	26	20	7	--	48	565
Florida Index			(4)	(3)	(1)		(7)	(85)

^a Percentage of emerged plants

Emergence was poor in 1959 in Florida due to an extremely wet season. The figures in parentheses represent percentages in each class. As was reported last year, the increase plots at Ames in 1958 showed a large leaf roll virus infestation. It is obvious what one roguing at Florida and Wisconsin did to the percentage of leaf roll plants. Also of interest are the figures for spindle tuber virus. This virus is of little consequence in commercial seed fields since contaminated lots are discarded by the winter test method in the

South. In breeding material this virus is very difficult to detect and often escapes unnoticed. Later when a selection is to be released and the breeder finds it is full of spindle tuber, it is too late to take remedial measures. This year's index will be planted about December 5 and we anticipate an even smaller amount of virus contaminants.

3-Hill Test. Early generation material is planted in this test. These are observed for various characteristics including vine type, vigor, maturity, general appearance, specific gravity, scab resistance, internal defects, external defects, flesh color, and texture. Many selections are discarded in this test. There were 452 entries in 1960 and of this number 126 were selected for further testing in the 20-hill test. These entries were selected from the single-hill planting of 1959 when 21,000 seedlings were planted. Only 452 or about 2 percent were selected and planted as the 1960 three-hill test. From these, 126 were selected representing 35 percent of the planting or .7% of the original number of seedlings. Next year, these 126 selections will be planted in the 20-hill test. We do not anticipate more than 1 out of 5 of that number will be selected. This percentage will then be about 0.15% of the original planting from true seed. Further reduction in number will occur in later tests. Several lines show much promise this year. We hope they continue to perform well.

20-Hill Test. This is a more advanced test in which we get our first information on the yielding ability of each selection. We had 135 entries. In general specific gravity readings were high this year reflecting a good season. This is particularly true of the Red Pontiac types which yielded very heavily. In Iowa table 2 data on the best selections are summarized. The yield is given in bushels per acre and is the result of only one 20-hill row. While this figure gives an indication of yielding ability, this is not sufficient information to have statistical significance. Outstanding selections will be indexed in Florida and increased in Wisconsin to maintain clean seed stocks. Seed raised this year in Wisconsin will be planted next year in the Iowa yield tests.

Iowa Yield Trial - Early. In the early yield trial Cobbler and Triumph are used as check varieties. Four replicates of 20 hills each comprise the test, and the results can be analyzed statistically. These results are given in Iowa table 3. The LSD values are the largest amount of difference we could expect due to chance. We were disappointed that no variety significantly outyielded Cobbler or Triumph. All varieties were better in scab resistance and appearance. Of the group, I 1443-43, and CS (58)11-1 will be returned to the Early yield trial for further testing. The remainder will be discarded.

Iowa Yield Trial - Late. Iowa table 4. Outstanding in this trial was Red Pontiac. Not only did it yield very heavily but it was good in appearance without the roughness commonly found. Pontiac did not have the solids, however, and other lines did not yield significantly less. I 5510.5 is a smooth white potato with a bright skin, slightly flat but comparable with Pontiac in yields and in solids. The line B 2364-8 has been released under the name Redskin. All other lines were significantly lower yielding than Red Pontiac. Despite this, line 5502-4 will probably be continued next year in the yield trials.

Iowa table 2. Summary of twenty-hill test, 1960.

Rank	Variety	U.S. No. 1's	Total	Scab	
		per acre	Solids	Area	Type
		Bu.	Pct.		
1	I 5757-11	996	15.6	T	2
2	F 90-Ia. 18	866	14.5	T	1
3	I 5765-2	785	15.8	T	1
4	I 1419-8	768	17.5	3	1
5	I 56288-8	756	14.7	T	2
6	B 3950-1	746	15.6	T	2
7	I 56288-3	730	13.5	1	1
8	I 57413-3P	728	14.5	T	3
9	I 57397-2	719	15.8	T	2
10	54.8-55-5	718	13.7	T	2
11	I 56389-1	716	17.3	T	4
12	ND 4552-Ia. 2	713	16.7	2	2
13	I 5704-3	710	15.2	T	2
14	I 57410-17	704	16.0	1	2
15	I 5711-15	704	16.2	0	0
16	I 57358-10	703	12.9	1	2
17	I 5704-1	701	-	T	2
18	I 5681-8	688	14.1	T	2
20	I 57410-10	687	15.2	T	1

Iowa table 3. Summary of Iowa yield trial, early and midseason, 1960.

Rank	Variety	Color	Maturity 1958	Yield per acre		Total Solids	Scab	
				Total	U.S.No.1's		Area	Type
				Bu.	Bu.	Pct.		
1	CS(58) 11-1	W	M	579	503	18.2	1	2
2	Cobbler	W	ME	561	506	17.1	T	4
3	Triumph	R	M	547	508	14.8	T	4
4	I 1403-4	W	E	503	407	16.7	2	2
5	I 1443-3	W	M	502	445	17.9	T	2
6	I 1193-1	W	ME	427	362	15.8	3	2

L.S.D. .05 116 Bu. per acre

L.S.D.	.01	160 Bu. per acre
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Iowa table 4. Summary of Iowa yield trial, late, 1960.

Rank	Variety	Color	Maturity 1958	Yield per acre		Total Solids	Scab	
				Total	U.S.No.1's		Area	Type
				Bu.	Bu.	Pct.		
1	Red Pontiac	R	L	774	743	14.1		
2	B 2368-4	R	L	643	605	16.2	3	1
3	I 5502-4	R	ML	563	518	16.2	1	2
4	I 1442-3	W	L	549	430	15.8	2	2
5	I 5510-5	W	VL	494	688	15.0	T	2
6	LA 1354	R	ML	471	433	15.4	2	2
7	I 1436-1	W	M	455	396	16.0	T	3
8	I 5583-3	W	ML	454	428	15.0	1	2
9	I 1380-1	W	ML	413	386	16.5	1	2

L.S.D. .05 - 96 Bu. per acre

L.S.D. .01 -131 Bu. per acre

Insect Resistance Studies

Potato selections planted in early May at Ankeny were grown without insecticide protection. Temperatures in May and June were mild, rainfall frequent, soil moisture throughout the season was abundant, and tuber growth progressed uninterrupted by excessive heat or drought. Rows were spaced 68 inches apart. Irish Cobbler variety was used in guard hills and to fill unequal ranges. Potato leafhopper, Empoasca fabae (Harris), infestations developed later than in the 1959 growing season. Adults were not much in evidence until after June 22nd and nymphs were not observed until July 6. The infestation developed to sufficient intensity between late July and mid-August to clearly mark hopperburn susceptible selections. Infestations of the potato flea beetle, Epitrix cucumeris (Harris), were present in moderate numbers throughout the season. Only a low intensity infestation of Colorado potato beetles, Leptinotarsa decemlineata (Say), persisted throughout the season.

Major objectives in the following experiments were to identify and characterize the components of field resistance to the potato leafhopper. These components may be either insect centered (e.g. in the preferential selection of the egg laying site) or plant centered (e.g. in the differential response of potato selections to the feeding of the potato leafhopper). Certain potato selections exhibit but little evidence of damage in response to leafhopper feeding which would destroy susceptible selections.

Experiments

Single-hill segregates. Single tubers from 2,439 pot-grown segregating F1 seedlings of 86 crosses made in the greenhouse by Mr. Lind Sanford at Ames were planted May 13 at Ankeny. Single hills were spaced 3 feet apart in the row. All plants showing extensive hopperburn were rogued in mid-August. Tubers were saved only from those free from hopperburn. The group is shown in Iowa table 5.

Three-hill observation plots. Selections previously made under heavy natural leafhopper infestations at Ankeny, Iowa, screened for viruses in Florida by Plant Pathology, and increased in Wisconsin, comprised 30 entries. Twenty-one additional entries represented selections received from Dr. J. P. Sleesman of the Ohio Agricultural Experiment Station, Wooster. Visual ratings of extent of hopperburn were made August 3 and again on August 31. Selections ranking 1 (least hopperburn, i.e., no hopperburn in 1960 season) are given in Iowa table 6. Tubers from selections ranking 1 (least hopperburn) and several ranking 5 (greatest hopperburn) are being reserved for further observations designed to characterize the nature of resistance to hopperburn.

Commercial varieties. Twenty-four commercial varieties procured from Stark's Farms, Rhinelander, Wisconsin, were grown in single-row four-hill plots randomized in 5 replications. Ratings of potato leafhopper damage (hopperburn) were made August 3. The yield of tubers was taken September 7. Results are given in Iowa table 7. The varieties Sequoia, Russet Burbank, and Katahdin exhibited less hopperburn than other varieties under equal opportunity for infestation.

Comparison of leafhopper infested and non-infested hopperburn resistant and susceptible potatoes. Weekly applications of endrin were made to half-plots of hopperburn resistant and hopperburn prone potatoes in order to ascertain by comparison with the untreated half if those showing but little hopperburn in reality suffered loss of yield under leafhopper infestation. Yields of tubers taken September 8 are given in Iowa table 8.

The hopperburn resistant selections in this case did not benefit from the nearly complete leafhopper control afforded by weekly enfrin applications. It may be postulated that these plants possessed some mechanism which counteracted the effect of leafhopper feeding enabling the plants to produce equally well in the presence or absence of leafhoppers. In contrast, the yield of susceptible strains were markedly increased by the prevention of the feeding of leafhoppers and the resultant preservation of good foliage until late in the season.

Iowa table 5. Selections free from hopperburn.

Pedigree Number	Parentage	Selected No.	Pedigree Number	Parentage	Selected No.
I 5820	I 801-10 x B3692-4	1	I 58187	B 3299-13 x ND 457-1	2
I 5834	I 872-4 (x)	1	I 58218	B 3672-3 (x)	1
I 5896	I 1415 x B3299-13	1	I 58239	B 3821-Ia.2xB 3124-Ia.3	1
I 58128	B 922-3 x I 1165-14	1	I 58281	ND 457-1xI 1165-14	1
I 58166	B 3124-Ia. 3 (x)	1	I 58298	41956 x ND 457-1	2
I 58184	B 3299-13 x B3124-Ia.	1	I 58405	Saco x B 922-3	1
		3 1			

Iowa table 6. Selections showing no hopperburn in 1960.

Ankeny, Iowa Series			Ohio Series	
1960 Inc. Number	Pedigree	Parentage	Pedigree Number	Designations
603	AI 5549-7	I 1077-14 (x)	BW 671	HB-2
604	AI 5554-1	I 1077-16 (x)	BW 670	No HB
606	AI 5554-3	I 1077-16 (x)	BW 671	No HB
613	AI 55326-1	X 927-3 x B 2368-4	BW 671	No HB
623	AI 56412-1	PI 214372-1 x ND 457-1	BW 670	No HB

Iowa table 7. Yield and hopperburn rating of 24 varieties.

Variety	Mean Hopperburn Rating ^a	Mean Lbs. Tubers per 4 hills	Variety	Mean Hopperburn Rating ^a	Mean Lbs. Tubers per 4 hills
Antigo	3.1	11.2	Red Warba	4.0	11.7
Cobbler	3.9	13.0	Russet Burbank	1.8	7.2
Chippewa	2.4	14.6	La 42-45	3.6	11.7
Dazoc	5.0	8.9	White Cloud	4.8	9.9
Early Gem	2.8	6.7	Catoosa	3.8	10.2
Katahdin	2.0	11.2	Russet Sebago	2.2	12.1
Boone	2.0	9.4	Sequoia	1.0	8.1
Rushmore	3.2	8.6	Sebago	2.4	10.8
Osseo	4.6	10.3	Tawa	4.4	9.3
Plymouth	3.1	13.6	Triumph	4.8	10.9
Red LaSoda	3.4	12.0	Waseca	5.0	12.4
Red Pontiac	4.4	12.5	White Rose	3.8	6.7

^a1, least hopperburn; 5, greatest hopperburn.

Iowa table 8. Comparison of leafhopper infested and non-infested hopperburn resistant and susceptible clones.

Hopperburn Resistant	Treated ^a Pound	Untreated ^a Pound	Increase due to treatment Pct.
B 4257 Ia. 10	57.4 ^a	66.0	-
AI 5561-13	86.4	85.2	1.4
AI 5561-12	60.6	67.4	-
Hopperburn Susceptible			
Cobbler (Minnesota)	215.5	121.6	77.2
Cobbler (Wisconsin)	202.3	124.6	62.4
I 56397-1	43.3	24.1	79.7

^aPounds per eight-hill plots

Selected clones. Only twelve clones were included this year in contrast to 40 last year, Iowa table 9. Included were 6 hopperburn susceptible and 6 hopperburn resistant clones. The entries were planted May 13 in single-row plots of 5 hills each (spaced 36 inches apart in the row). Plots were randomly placed in 6 replicated blocks. Irish Cobbler guard hills surrounded each replication. One selection, I 5583-3, failed to emerge.

Major objectives were to confirm or refute the validity of observations made in 1959 with respect to relative attractiveness of the selections to ovipositing leafhoppers, the relative survival of nymphs, and the relative degree of hopperburn.

Iowa table 9. Summary data from observation of twelve selected clones.

Potato Selection	Potato Leafhopper Eggs in Weekly Counts		Potato Leafhopper Nymphs		Hopperburn Rating ^a	Tubers per six 5-hill plots Pounds
	1959 Season	1960 Season	1960 Season	1960 Season		
3 RC-8	223	679	439		4.3	25.2
I 55238-1	195	662	565		3.3	38.8
Cobbler	174	631	662		4.8	31.3
B 2067-52	152	585	467		4.8	20.4
AI 5561-5	117	444	314		2.6	7.7
B 4257-Ia. 10	121	339	345		2.8	23.2
AI 5561-8	119	328	190		1.5	24.7
AI 5561-12	-	319	206		1.8	28.1
I 5561-2	99	309	171		2.1	62.1
AI 5561-12a	73	289	224		1.1	86.3
AI 5561-13	69	262	183		1.3	32.8

^a1, least hopperburn; 5, greatest hopperburn.

Methods of observation and sampling. All eggs deposited in the mid-ribs and blades of 5 apical leaflets randomly selected, 2 from the mid-vertical axis of 3 plants per plot, were counted with the aid of a binocular microscope after the leaves had been removed to the laboratory and cleared by a lactophenol technique. All nymphs occurring on 5 apical leaflets randomly selected, 2 from the mid-vertical axis of 3 plants per plot, were counted weekly in the field. Visual rating of hopperburn, relative within the planting, was made August 3. Five relative classes ranging from 1 (least hopperburn) to 5 (greatest extent of hopperburn) were estimated by two observers individually. Results are given in Iowa table 9.

Rank of the 11 entries, with respect to numbers of eggs received throughout the season was nearly alike (column 1 and 2 left) for 1959 and 1960. This substantiates our observation that differential attractiveness to ovipositing leafhoppers exists and further suggests that relative "resistance" to oviposition may be rather consistent. Nymph infestations generally reflected egg deposition differential among entries. The late-in-season arrival of leafhoppers this year may not have severely damaged early maturing selections.

To summarize the season's findings, the selection of hopperburn resistant strains of potatoes probably includes (a) strains that are in some way unsuitable as sites for egg deposition by the potato leafhopper, and (b) strains that possess certain mechanisms which prevent plant damage (hopperburn) resultant from the feeding of potato leafhoppers.

In the case of potato strains sufficiently advanced in the breeding program to be of promise, a comparison of tuber yield of plants grown under heavy natural leafhopper infestation with tuber yields of the same clones grown under insecticidal protection should help identify those naturally resistant to the potato leafhopper.

Combining Ability Experiment

A study was conducted to obtain estimates of general and specific combining ability variances from tests of 190 F_1 crosses and to evaluate six proposed tester clones for total yield, specific gravity, and tuber appearance.

Crosses were made between 45 diverse breeding lines and six clones selected as testers. The 190 crosses obtained were tested at Ithaca and Riverhead, New York, in cooperation with Dr. R. L. Plaisted, and at Clear Lake, Iowa, in a modified rectangular lattice design. Total yields were taken at all locations. Specific gravity and tuber appearance measurements were recorded only at Clear Lake, Iowa.

The calculation of line, tester, and line x tester variance components indicated that specific combining ability was relatively more important than general combining ability for yield. No substantial differences in the general combining ability of testers could be found in comparing their means. Significant interaction of specific combining ability with locations was observed. Calculation of relative effects of each tester revealed that tester TL 1859 was consistently high in all locations. It was concluded that its effect was largely non-additive. These yield data indicate that genetic improvement through selecting for additive effects would be difficult. A large number of testers would be required to select from the relatively small additive effects found.

General combining ability was found to be more important than specific combining ability in determining specific gravity. Tester B962-32 was significantly superior in mean performance to the two poorest testers. Testers B962-32, ND457-1 and B3131-8 gave the largest relative effects. Each of these clones is of high specific gravity. The three low specific gravity testers gave relatively small effects. It was concluded that the phenotypic response of a parent for specific gravity would give fair prediction of its progenies performance. The data suggested that good general combining clones could be obtained through recurrent selection for additive effects.

General and specific combining ability were found to be of equal importance in determining tuber appearance. Tester ND457-1 was found superior as a general combiner. This tester and Katahdin gave the largest relative effects. These results agree with previous observations of the excellence of both clones as parents. It was felt that additive variation for tuber appearance is of sufficient magnitude to realize substantial genetic progress through development of clones of high general combining ability.

Comparisons of crosses between related, and unrelated lines and testers indicated that the relationship between testers and lines apparently has little or no effect on the resulting progeny.

KANSAS
J. K. Greig and Others^{1/}

The yields per acre and total solids for 14 varieties tested at Manhattan and 12 varieties tested at 5 other locations are presented in Kansas tables 1 and 2. Four replications in randomized block designs were used at each location.

The yields and total solids were presented by eastern and western areas in the State, because of the difference in climatic conditions. The eastern locations normally do not need irrigation, but it is essential in the western locations. The yields at Garden City and Leoti were considerably lower than at Colby, probably because of lack of more frequent irrigations. Recommended pest control practices were followed at all locations. Certified Red Warba, Red Pontiac, Kennebec and Cobbler seed stocks were obtained locally. Norland was obtained from a certified grower in North Dakota, and all other varieties from the Nebraska Certified Growers, Alliance, Nebraska. Total solids were determined by use of a potato hydrometer.

1/ Cooperators: Erwin Abmeyer and Elbert Eshbaugh, Northeast Kansas Experimental Field, Wathena; Evans Banbury, Superintendent, Colby Branch Experiment Station; Floyd Davidson, Superintendent, Mound Valley Branch Experiment Station; Andrew B. Erhart, Superintendent, Garden City Branch Experiment Station; Roy E. Gwin, Jr. and T. B. Stinson, Irrigation Experimental Field, Leoti.

Kansas table 1. Potato variety trials at 3 locations in eastern Kansas, 1960

Variety	U. S. No. 1			U. S. No. 1			U. S. No. 1		
	yield	Total	Chip	yield	Total	yield	Total	yield	Total
	/acre	solids	color	/acre	solids	/acre	solids	/acre	solids
	Cwt.	Pct.		Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Bounty	234	17.1	8	137	16.9	101	18.6	157	17.5
Cobbler	229	18.0	3	164	18.4	123	20.7	172	19.0
Red LaSoda	231	16.0	8	134	16.5	111	18.2	159	16.9
Red Pontiac	221	14.1	-	138	16.0	107	15.8	155	15.3
Excel	173	20.1	7	110	19.4	61	21.4	115	20.3
Haig	178	18.4	3	93	18.0	104	20.5	125	19.0
Kennebec	163	16.0	4	-	-	-	-	163	16.0
Redbake	163	17.7	8	77	17.3	85	21.2	108	18.8
Plymouth	170	17.7	5	138	18.0	65	21.8	124	19.2
Tawa	145	17.5	3	130	17.3	76	19.9	117	18.2
Norland	143	15.2	7	127	16.7	109	17.3	126	16.4
Early Gem	130	15.6	9	131	15.6	95	17.5	118	16.2
Dazoc	72	17.1	6	97	18.2	79	20.1	83	18.5
Red Warba	88	18.0	-	135	17.7	-	-	111	17.9
L.S.D. 5%	47	0.6		28	0.8	n.s.	1.0		
Planted	April 7			April 8		March 29			
Harvested	July 20			July 27		July 11			
Irrigations	1			0		0			
Fert./A: N	46 lb.			30 lb.		16 lb.			
P ₂ O ₅	92 lb.			60 lb.		48 lb.			
K ₂ O	46 lb.			30 lb.		16 lb.			
Row spacing	36"			36"		42"			
Plant spacing	12"			12"		9"			

2/ Chips made by Frito-Midwest Co. ranked according to Proposed Color Reference Standard of National Potato Chip Institute, Jan. 25, 1954. 3/ Severe hail damage July

Kansas table 2. Potato variety trials at 3 locations in western Kansas, 1960.

Variety	U. S. No. 1		U. S. No. 1		U. S. No. 1		U. S. No. 1	
	yield	Total	yield	Total	yield	Total	yield	Total
	/acre	solids	/acre	solids	/acre	solids	/acre	solids
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Bounty	393	20.7	169	18.8	208	not	257	19.7
Red Pontiac	405	18.2	186	15.8	198	deter-	263	17.0
Red LaSoda	400	19.0	180	17.5	221	mined	267	18.2
Cobbler	306	20.3	211	19.7	185		234	20.0
Excel	273	22.0	135	20.9	143		184	21.4
Early Gem	283	17.5	170	18.2	159		204	17.7
Plymouth	308	20.9	154	20.3	161		208	20.6
Norland	235	16.5	162	17.1	127		175	16.8
Redbake	171	21.2	122	20.1	165		152	20.6
Haig	167	19.0	163	19.7	145		158	19.3
Dazoc	182	19.0	113	19.4	99		131	19.2
Tawa	235	19.2	137	19.7	113		162	19.4

L.S.D. 5% 62 0.8 42 0.6 46

Planted	April 5	April 4	April 11
Harvested	August 15	August 10	August 27
Irrigations	6	2	3
Fert./A: N	29 lb.	26 lb.	100 lb.
P ₂ O ₅	58 lb.	78 lb.	0
K ₂ O	0	0	0
Row spacing	36"	36"	30"
Plant spacing	12"	12"	12"

KENTUCKY
Dean E. Knavel

Potato Variety Trials

The plot design was of the randomized block type with 3 replications. Each plot was 35 feet long with 6 feet between replications. The rows were 3 feet apart and the seedpieces were spaced 12" apart in the row. An application of 6-12-12 fertilizer was broadcast at the rate of 1800 lbs. per acre and disked into the soil prior to planting. Dinitro weed killer was applied prior to come-up and no cultivation was used throughout the season.

The results are presented in Kentucky table 1.

Kentucky table 1. Potato variety test for yields and solids content, Lexington, Kentucky, 1960.

Variety	Yields	U.S.No.1	Solids	Stalk *
	per acre		(at harvest)	
	Cwt.	Pct.	Pct.	Position
La 1859	214	94	17.7	E
B 991-3	70	84	16.9	SE
B 2858-5	186	87	19.4	E
F 4713	224	91	17.5	SE
Plymouth	199	92	17.7	SE
Tawa	176	86	16.0	SE
Onaway	262	94	15.6	SE
Redburt	308	94	16.0	E
Manota	212	86	16.9	S
Red Warba	294	86	15.8	SE
Kasota	216	78	16.7	SE
I. Cobbler	291	88	17.3	S
Kennebec	269	95	17.7	E
Katahdin	194	93	16.9	SE
Pontiac	216	94	15.6	E
B 3604-1	96	51	13.3	E
B 3696-13	298	89	17.5	E
B 73-3	128	86	18.8	E
B 2187-25	194	93	16.0	E
Rushmore	219	96	15.6	SE
Red Beauty	129	77	17.1	E
B 3309-8	258	87	14.5	SE
Ia 8140-1	173	92	16.0	S
B 2368-13	250	87	16.5	SE
B 3453-2	235	82	18.6	SE
B 4212-1	119	75	14.5	SE
51-1-53-12	202	83	15.0	E
Redbake	113	76	17.1	E
X 1276-185	234	86	15.4	S

L.S.D. 5% = 15

1% = 19

* Stalk position: E = Erect; SE = Semi-erect; S = Spreading.

LOUISIANA
Julian C. Miller

The Irish potato program for 1960 continued toward its main objectives of producing high-yielding, red and white varieties which have scab and blight resistance and high nutritional quality. Our markets are requesting that we select more oblong potatoes which will be suitable for chipping, french fries, shoe strings and other processed forms, as well as for the fresh market. Other lines of investigations, such as fertilizer and storage tests, are also receiving considerable attention. Breeding varieties which show some degree of frost resistance is being pursued further. Crosses between Solanum acaule and Solanum tuberosum and their progeny are being tested. A number of promising lines are in the F₃ generation.

Around 18,000 seedlings were grown in the greenhouse at Baton Rouge in the fall of 1959. Two thousand first-year seedlings were selected from this lot to be planted in South Dakota on May 15, 1960. From this number 144 selections (118 whites and 26 reds) were kept at harvest time on September 20, 1960. These selected lines along with other advanced selections will be grown in the North for further increase and evaluation.

Of the 1959 selections, 91-24 and 91-28 were outstanding. It will be interesting to observe their future development. They both ran better than 20 percent solids. Selection 91-24 is blocky in shape and 91-28 is a beautiful, smooth, oblong potato.

After disposition has been made of 91-78 and 42-45, the present entries in the regional trials, 61-125, a very early white, which runs around 24 percent in solids when grown in the North and around 20 percent when grown in the South, and 62-162, a very vigorous red, will be the next two entries. The 62-162 might be a bit late in some areas, but so far, both it and 61-125 have shown resistance to blight and scab under our conditions. Selection 91-78 is the best potato for chipping we have ever tested in Louisiana. It is the blocky Cobbler type in shape and is reasonably early. The 42-45 is a beautiful red potato with a glossy skin. These two show some degree of resistance to scab, although not immune. They have been in the regional trials for the past two seasons and are well distributed and will probably be increased in a number of states.

Notes on Selections

(A) 1960 Seedlings: Louisiana table 1. One hundred and forty-four selections were made in South Dakota from 23 combinations. One hundred and eighteen of these were white and 26 were red. Approximately half of the lines were from the parental combinations of (1) 91-78 x Katahdin, (2) 91-143 x Katahdin and (3) 1859 x 3309-8.

(B) 1959 lines: Louisiana table 2. Of the 151 individuals selected in 1959 only 39 were considered worthy of selection in South Dakota. This number was reduced to 28 after other factors were considered such as quality, etc. L 91-24 was rated as the top round white of this group and L 91-28 was ranked as the best oblong.

(C) Other lines: L 91-78 is a high quality, round, white, and as a chipper it surpasses other standard varieties. Its yield performance with commercial and certified growers has been outstanding. This line will probably be named and released. L 42-45 is a smooth, bright red potato, possessing some scab resistance and is thought to have potential due to its yielding ability and earliness. L 61-125 is a very early white of high quality. L 62-162 is a late, very scab resistant red that may have a place in some parts of the potato region.

Selection Trials

In all yield trials the randomized block design was used. Each 40-foot plot with seed spaced at 12 inches within was replicated 4 times. Approximately 1000 pounds of a 6-12-6 fertilizer was applied per acre with 32 pounds of nitrogen used later as top dressing.

Selection trials are based primarily on the yielding ability, quality, and disease resistance of seedlings as compared to standard varieties. These selections are made under both Louisiana and Northern growing conditions.

While emphasis is still on the development of both red and white-skinned varieties, the need for a high quality, white-skinned potato which will perform well under Louisiana conditions is receiving more and more attention. Seedlings 91-78 and 61-125 have shown promise in this direction.

Through selection for the characteristics mentioned above, all of the 1957 and 1958 seedlings except one have been eliminated. This seedling, 81-63, is being increased for more elaborate testing. It is a very attractive white-skinned potato with high yielding ability.

Presented in Louisiana tables 3 and 4 are the yields of the advanced seedlings as compared to some of the standard varieties. Louisiana table 3 gives the yields from plantings at four locations in Louisiana. Red LaSoda and seedling 42-45 were consistently the highest yielding entries at each location. Seedling 42-45 is very similar to Red LaSoda in all respects, and shows some resistance to common scab. Seedling 62-162 also yielded well, and has shown resistance to both scab and blight. This seedling has a very desirable dark red skin. Kennebec and 91-78 were the outstanding white-skinned entries in the tests. Kennebec has been a reliable yielder, but has shown great susceptibility to Verticillium wilt in the past. Growers have been reluctant to plant this variety for that reason. Seedling 91-78 is an excellent chipper and yields well as compared to other varieties. It is similar to Cobbler in appearance but shows resistance to common scab. Cobbler is very susceptible to this disease. Seedling 61-125 merits further testing due to its earliness, excellent quality and shape. Burbank and White Rose have never shown adaptability for Louisiana growing conditions. Both varieties produce knobby, irregular shaped potatoes. The culinary quality of White Rose is very poor.

Yield comparisons of Red LaSoda and advanced seedlings with other standard varieties for a five-year period are given in Louisiana table 4. Red LaSoda has produced the highest yields over the five-year period, while for a four-year period 42-45 has outyielded all other varieties. Katahdin and 91-78 have yielded better than the other white-skinned varieties for this five-year period.

Disease Resistance Studies

Common Scab: Resistance of seedlings to common scab (Streptomyces scabies) is determined through field testing at Plaquemines Parish Experiment Station where a uniformly infested plot is available, Louisiana table 5. Several seedlings have shown a high degree of resistance to this disease while others have been very susceptible. Some of those showing resistance are 42-45, 91-78, 62-91, 62-162, 71-148 and 82-4. Those showing resistance to a lesser degree are 61-67, 61-125, and 81-63. Very susceptible seedlings are 72-27, 72-39, 72-60, 72-122, 81-67, 81-68, and 81-100.

Late Blight: All seedlings having blight resistant parentage, or having shown resistance in previous tests, were tested for resistance to late blight (Phytophthora infestans). Leaves from each seedling were inoculated with the blight organism and placed in a moist chamber at 60°F. The results of these tests were erratic and inconclusive. These seedlings are being tested again using a different method. From previous tests, however, 91-78 and 62-162 have shown resistance to this disease.

Quality Studies

Total solids content of a number of varieties and seedlings grown at two northern locations and three locations in Louisiana are presented in Louisiana table 6. In general, dry-matter content was higher in tubers grown at the northern location. However, seedling 91-78, Rushmore and LaSalle grown under Louisiana conditions produced tubers having comparatively high solids content.

Chip rating, yield of chips, and specific gravity data are presented in table 7. Seedlings 91-78, 61-193, 61-195, and the Sebago variety were chipped under commercial conditions again this year, and seedling 91-78 was picked as having the best chipping quality. Chip processors in Louisiana have shown considerable interest in this seedling.

Of the seedlings selected in the year 1959, seedlings 91-24 and 91-28 produce tubers having excellent chipping quality.

Pollen Studies

An advantage in most breeding programs is the preservation of pollen from season to season. This makes possible the hybridizing of selections or varieties which do not bloom at the same time and the use of stored pollen from a good male parent which, for one reason or another, fails to produce an abundance of highly viable pollen in the current blooming season.

Pollen has been stored in the Irish Potato Breeding and Development Project from one season to the next and longer in an environment of low temperature and controlled humidity. This method, however, is not always reliable since the storage setup cannot always be kept under complete control.

Extensive experiments have been carried out during the past two years in the Horticultural Research Department on the freeze-drying gas storage of pollens. The results of the tests indicate that pollen can be stored for an extended length of time after this treatment, even in an otherwise uncontrolled environment. Irish potato pollen was successfully freeze-dried, then stored in nitrogen gas for over two months in the spring of 1960 in an otherwise uncontrolled environment. The experiments on potato pollen freeze-drying are not considered complete, since it is believed that the optimum exposure of the pollen to freeze-dry action has not yet been attained. The tests will continue in the spring of 1961, at which time it is expected that the time of storage in nitrogen can be greatly extended. It should then be possible to ship potato pollen any distance without special precautions in packaging against loss of viability enroute.

Louisiana table 1. Seedlings selected in South Dakota, 1960.^{1/}

Parentage	Number of selections	Parentage	Number of selections
72-6-3 x 1859	9	12-94 x 22-153	3
42-45 x 61-45	1	22-153 (x)	2
52-42 (x)	3	52-50 (x)	1
62-162 x Katahdin	9	LaSalle x 91-143	1
91-78 x Katahdin	33	I 913-2 x Katahdin	3
91-78 x 91-143	7	Cobbler x 61-45	3
91-78 x 1859	5	Cobbler x 62-80	1
91-143 x Katahdin	22	Cobbler x 91-143	2
91-143 x 61-45	8	Cobbler x Katahdin	5
1859 x 3309-8	15	71-3-1 x 62-60	4
12-91 x 1859	1		
12-94 x 1859	1		
12-94 x 92-23	5	Total	144

Twenty-six of these seedlings are red, and 118 are white.

Louisiana table 2. Data on seedlings selected and reselected when grown in South Dakota, 1960.

Selection	Parentage	Solids	Chip Rating *	Remarks
		Pct.		
91-8	81-113 (x)	19.8	4	Early, oblong
91-13	81-113 (x)	21.2	5	Early, round, smooth
91-24	81-113 (x)	24.0	2	High quality, early, round
91-28	81-113 (x)	19.6	3	High quality & yield; medium oblong
91-29	81-113 (x)	18.6	4	Early; Cobbler type; deep eyes
91-33	81-113 (x)	17.9	5	Early; Cobbler type
91-34	81-113 (x)	18.2	4	Early, blocky
91-36	81-113 (x)	22.6	5	Early, large size, slightly oblong, cracks; scab

continued

Louisiana table 2, continued.

92-77	52-42 x Red LaSoda	20.4	4	Medium; oblong, high yield; scab
92-78	52-42 x Red LaSoda	13.4	5	Early, round, high yield, scab
91-82	22-153 x 6519	21.4	4	Early, oblong; Rank 3
91-87	(RLS x 1859) x Kat.	18.3	5	Early, semi-oblong, scab
92-95	6-148 x 1859	20.5	4	Early, pale color
91-96	6519 (x)	22.4	5	Early, oblong; Rank 4
92-103	605-10 x 6519	20.3	4	Late, oblong, rough, scab
91-104	91-143 x 1859	19.2	5	Early, oblong
91-109	19468 x 1859	20.74	4	Late, oblong, russet, deep eyes; Rank 5
91-123	(RLS x 1859) x Kat.	16.5	9	Late, blocky, rough
91-133	X 590-7 x Cayuga	22.7	5	Early, oblong, scab
91-136	X 590-7 x Cayuga	18.4	4	Early, high sugar, should be good boiler, pink eyes
91-139	81-113 (x)	17.4	9	Very late, very green, vigorous, blocky; Rank 6
91-141	81-113 (x)	19.3	5	Late, blocky, scab
91-144	81-113 (x)	19.8	4	Late, blocky, scab
91-145	81-113 (x)	21.6	5	Late, blocky, good yield, scab
91-148	81-113 (x)	19.3	4	Late, oblong, good; scab; Rank 7
91-150	81-113	20.0	5	Early, round, russet; scab; discard
61-125	92-167 x 12-25	21.8	3	
6937		21.7	4	

*Rating according to color chart of Proctor and Gamble Scale of 1 - 10; the lower the rating the lighter the chip color.

Louisiana table 4. Yields of Red LaSoda and advanced seedlings as compared to other standard varieties over a five-year period, 1956-60.

Variety or Seedling	Yield of No. 1's per acre					Average
	1956	1957	1958	1959	1960	
	Bu.	Bu.	Bu.	Bu.	Bu.	Bu.
Red LaSoda	282	415	145	285	338	293
Katahdin	204	297	156	237	276	234
Sebago	202	253	79	186	192	182
Rushmore	79	105	144	187	207	144
42-45	--	418	189	300	324	308
91-78	167	235	134	229	271	207

Louisiana table 5. Resistance of seedlings and check varieties to common scab
Plaquemines Parish Experiment Station, 1960.

Variety or Seedling	Most Representative Scab* ^{1/}		Variety or Seedling	Most Representative Scab* ^{2/}	
	Area	Type		Area	Type
Red LaSoda	1	2	72-27	2	3
Cobbler	2	3	72-39	3	4
42-45	T	1	72-60	2	3
91-78	T	1	72-62	1	3
62-42	1	2	72-100	1	1
61-45	1	2	72-101	1	1
61-67	1	1	72-122	2	3
61-81	1	3	71-148	T	1
62-91	T	1	82-4	T	1
61-103	1	1	81-63	1	1
61-125	1	1	81-66	1	2
62-162	T	1	81-67	2	3
61-193	1	2	81-68	2	3
61-195	1	2	81-100	2	3
72-25	1	1	82-104	1	1

^{1/} *Area: T, less than 1%; 1, 1-20%; 2, 21-40%; 3, 41-60%; 4, 61-80%; 5, 81-100%.

^{2/} *Type: 1, small, superficial; 2, larger, still superficial; 3, large, rough pustules; 4, large pustule, shallow holes; 5, large pustule, deep holes.

Louisiana table 6. Total solids readings on Irish potato varieties and seedlings from two Northern and three Louisiana locations, 1960.

Variety or Seedling	Northern Locations		Louisiana Locations			Ave.La. locations
	Clark, S.D.	Rhineland, Wisc.	Baton Rouge	New Roads	Thibodaux	
	Solids Pct.	Solids Pct.	Solids Pct.	Solids Pct.	Solids Pct.	
Red LaSoda	19.2	16.0	16.7	16.2	18.8	17.3
Katahdin	--	19.2	17.5	16.2	19.4	17.7
Sebago	--	16.0	15.4	16.2	17.7	16.5
Cobbler	--	20.9	18.8	--	--	18.8
LaSalle	--	17.3	18.0	17.7	19.7	18.4
Kennebec	--	19.4	17.7	16.9	--	17.3
Pontiac	--	18.4	15.6	--	--	15.6
Rushmore	--	18.0	18.6	18.2	18.4	18.4
Burbank	--	21.2	19.0	16.9	20.1	18.6
White Rose	--	16.7	16.0	16.0	--	16.0
42-45	18.4	19.0	17.5	18.0	20.1	18.6
91-78	18.0	19.4	18.4	18.8	19.7	19.0
62-42	15.2	--	15.4	--	--	15.4
61-45	16.0	--	16.9	15.4	--	16.2
61-67	19.0	--	15.4	14.3	19.7	16.5
61-81	18.4	--	18.0	17.1	--	17.5
62-91	16.5	--	16.0	--	--	16.0
61-103	18.0	--	16.5	--	19.2	18.0
61-125	20.7	--	19.0	18.6	--	18.8
62-162	16.0	--	17.1	--	--	17.1
61-193	16.2	--	16.0	--	--	16.0
61-195	19.9	--	18.2	15.6	--	16.9
72-100	18.4	--	17.5	--	--	17.5
81-63	--	--	16.0	--	--	16.0
81-66	--	--	17.7	--	--	17.7
81-67	--	--	17.5	--	--	17.5
81-68	--	--	18.2	--	--	18.2
81-100	--	--	18.0	--	--	18.0
82-104	--	--	16.5	--	--	16.5
Catoosa	--	--	--	14.3	--	14.3

Louisiana table 7. Chipping quality of some Irish potato varieties and advanced seedlings, 1960.

Variety or Seedling	Wt. before frying	Wt. after frying	Yield	Chip rating*	Specific gravity
	Grams	Grams	Pct.		
Red LaSoda	200	70	35.0	5	1.066
Katahdin	200	70	35.0	4	1.070
Sebago	200	78	39.0	3	1.060
Cobbler	200	71	35.5	6	1.076
LaSalle	200	71	35.5	3	1.072
Pontiac	200	64	32.0	7	1.061

continued

Louisiana table 7, continued.

Rushmore	200	77	38.5	3	1.075
Burbank	200	78	39.0	4	1.077
White Rose	200	64	32.0	5	1.063
42-45	200	69	34.5	5	1.070
91-78	200	67	33.5	2	1.074
61-67	200	70	35.0	4	1.060
61-125	200	71	35.5	5	1.077
62-162	200	62	31.0	4	1.068
61-193	200	70	35.0	4	1.063
61-195	200	72	36.0	3	1.073

* Rating according to color chart of Procter and Gamble; Scale of 1-10; the lower the rating the lighter the chip color.

CODE NUMBER AND PARENTAGE OF LOUISIANA BREEDING LINES

<u>Code Number or Name</u>	<u>Parentage</u>	<u>Code Number or Name</u>	<u>Parentage</u>
LaSoda	Triumph x Katahdin	42-23	92-23 selfed
Red LaSoda	Triumph x Katahdin (mutant)	42-45	02-5 selfed
Triumph	Peerless x Early Rose	91-10	Katahdin x 494-1
Katahdin	USDA 40568 x 24642	92-23	81-113 x 465
Rushmore	Green Mountain x Katahdin	91-78	Green Mt. x Cayuga
Pontiac	Triumph x Katahdin	91-143	Cherokee selfed
Sebago	Chippewa x Katahdin	92-167	Cherokee selfed
Cherokee	B 61-3	226	
02-5	LaSoda x Progress	1859	Pontiac x 96-56
12-25	Neb. 113-43-1xB 400-1	6279	1859 selfed
12-51	93-10 x 9741	MSS 4-2	(S.acaule var.Recoba 8n x Kat.) x 22-153
12-69	9744 x B 974-56		
12-91	(Cherokee x B91-14)xTriumph	Bona	Holland variety
12-92	(Cherokee x B91-14)xTriumph	Falke	Holland variety
12-94	(Cherokee x B91-14)xTriumph	Furore	Holland variety
22-14	Krantz Scab #1	Gineke	Holland variety
22-153	Cherokee x La. Mex.	81-63	627-167 x B 3410-27
22-194	Cherokee x La. Mex.	81-113	B 76-43 x Katahdin
31-86	81-147 selfed	61-125	92-167 x 12-25
32-92	01-157 selfed	62-162	92-167 x 12-92
41-21	91-273 selfed	61-193	1859 x Neb. 26.44-1
		61-195	1859 x Neb. 26.44-1

MAINE

Hugh J. Murphy, Allen E. Schark, Michael Goven

Cooperative variety trials were conducted in Maine during 1960 at Presque Isle and Washburn in Central Aroostook County and at Exeter in Central Maine. The parentage and main characters of the varieties and seedlings tested are given in Maine table 1. Yields of all varieties in all trials were below normal but specific gravities were about the highest ever recorded in Maine. The results for yields and specific gravities are presented in Maine table 2 and percentages of U. S. No. 1 and Maine U. S. No. 1 (size A) are presented in Maine table 3.

In 1960 Mohawk and Kennebec appeared to be outstanding in both yield and specific gravity for the named varieties, while seedlings B 3563-2 and B 2894-24 looked promising. Avon, Fundy, Huron, and the Canadian seedlings did not rank as high in yield and specific gravity as expected. Loss of yield data in Central Maine makes conclusions on their adaptability for that area impossible. Results of the Fall chipping and french fry studies are presented in Maine tables 4 and 5. All varieties except Huron and B 3454-5 at Presque Isle produced satisfactory chips. French fry color was excellent for all varieties and french fry textures were all mealy. The 1960 frying tests produced some exceptionally light colors, and in some cases textures may be too mealy for making satisfactory french fries.

Results of a fourth variety trial conducted for the Birds-Eye Division of General Foods, Inc., at Caribou, Maine, are given in Maine table 6. In experimental frying tests all varieties were of satisfactory color and texture. Birds-Eye indicated their requirements for french fries are low sugars, oblong shaped tubers, that build sugars slowly and recondition rapidly.

In general results of the 1960 cooperative variety trials were successful but probably not representative of varietal performance because of the unusually dry growing conditions.

Maine table 1. Parentage and characters of varieties and seedlings in yield trials, Maine, 1960.

Variety	Parentage	Matur- ity	Skin Color	Disease Resistance ^{1/}
Antigo	Menominee X Wis.302.44-6	E	C	Sc.
Avon		M	C	Lb., Sc.
Cobbler		E	W	Virus A
Fundy	Keswick X 96-56	E	W	Lb.
Golden Chip		M	W	Lb., virus A, net nec.
Huron	Sebago X Hindenburg	L	C	Sc.
Katahdin-A	40568 X 24642	L	C	Virus A, Lr., net nec.
Katahdin-B	40568 X 24642	L	C	Virus A, Lr, net nec.
Kennebec	B 127 x 96-56	M	W	Lb., virus A, net nec.
Mohawk	Gr. Mountain x Katahdin	L	Buff	Lb., Sc., virus X, rhizoc.
Norland	Redkote x ND 626	E	R	Sc.
Rushmore	Katahdin x Gr. Mountain	E	Russ	None
Russet Sebago	Selection from Sebago	L	Russ	Sc., Lb., virus A, Y dwarf
B 2894-24	Kennebec x Teton	L	C	Lb., Sc., virus A
B 3454-5	B 2368-2 x B 2368-17	M	R	Sc., virus Y

continued

Maine table 1, continued.

B 3563-2	(X 927-3) x Katahdin	M	W	Lr., virus Y
B 3570-5	B 2834-3 x (X 927-3)	M	C	Lr., viruses X and Y
B 3604-1	Saranac x B 2395-14	M	W	Lb., Sc., virus Y
B 3696-13	B 3097-16 x Ac 25959	M	C	Lb., Sc.
B 3802-15	B 859-10 x B 24-58	E	W	Lr., virus Y
B 4093-18	Menominee x B 881-12	M	Russ	Sc.
B 4121-7	B 2925-23 x B 294-38	M	W	Lb., virus Y
B 766-E	B 157-9 x Teton	M	C	RR., virus Y
F 4613		M	W	Lb., Sc.
F 5025	S. demissum x Katahdin	M	W	Virus Y
WY 1122		M	C	RR., virus Y

1/ Late blight resistance is to the common race of the organism.

Net necrosis is a tuber necrosis caused by current-season leaf roll infection.

Maine table 2. Yield and specific gravity of potato varieties grown at three locations in Maine, 1960.

Variety	Presque Isle		Washburn		Exeter ^{2/}
	Yield per acre Cwt.	Specific gravity	Yield ^{1/} per acre Cwt.	Specific gravity	Specific gravity
Antigo	232	1.085	--	1.090	1.083
Avon	245	1.094	207		1.088
Cobbler	234	1.098	196	1.097	1.088
Fundy	244	1.095	--	1.098	1.087
Golden Chip	288	1.100	211	1.098	1.085
Huron ^{3/}	251	1.092	--	1.088	1.080
Katahdin-A	291	1.098	205	1.098	1.086
Katahdin-B	262	1.097	209	1.097	1.084
Kennebec	296	1.102	232	1.100	1.086
Mohawk	308	1.106	210	1.105	1.089
Norland	243	1.084	212	1.082	1.071
Rushmore	258	1.088	--	1.095	1.084
Russet Sebago	263	1.092	193	1.090	1.079
B 2894-24	260	1.094	212	1.094	1.082
B 3454-5	215	1.086	153	1.091	1.083
B 3563-2	257	1.102	184	1.107	1.090
B 3570-5	239	1.094	--	--	--
B 3604-1	284	1.092	209	1.093	1.083
B 3696-13	245	1.092	--	1.097	1.088
B 3802-15	242	1.094	173	1.097	1.086
B 4093-18	--	--	180	1.087	--
B 4121-7	227	1.092	159	1.094	1.082
B 766-E	245	1.092	207	1.093	1.080
F 4613	--	--	--	--	1.082
F 5025	255	1.100	209	1.102	1.089
WY 1122	280	1.093	--	1.091	1.081
L.S.D. 0.05	30	0.003	29	0.003	0.003
L.S.D. 0.01	40	0.004	38	0.004	0.004

1/ Yields on some varieties not reported because of poor stands and/or diseased plants in excess of 10 percent of total stand.

2/ No yields obtained because of poor weed control practices.

3/ Seedpieces of Huron variety spaced 12 inches apart. All others 8 inches.

Maine table 3. Percentage of yield between 1 7/8 and 4 inches in size for potatoes grown at two locations in Maine, 1960.

Variety	Presque Isle		Washburn	
	Class	Class	Class	Class
	1 7/8-4 inches	2 1/4-4 inches	1 7/8-4 inches	2 1/4-4 inches
Antigo	97	67	--	--
Avon	97	70	98	65
Cobbler	94	47	94	46
Fundy	98	79	--	--
Golden Chip	97	77	97	67
Huron	96	75	--	--
Katahdin-A	97	78	97	61
Katahdin-B	97	78	96	63
Kennebec	98	82	99	73
Mohawk	97	87	98	81
Norland	97	61	97	64
Rushmore	67% between 4-10 ounces		--	--
Russet Sebago	95	70	96	55
B 2894-24	98	82	98	72
B 3454-5	--	--	92	43
B 3563-2	98	78	96	53
B 3570-5	97	73	--	--
B 3604-1	96	62	96	61
B 3696-13	96	77	--	--
B 3802-15	94	55	95	47
B 4093-18	--	--	96	83
B 4121-7	97	73	98	82
B 766-E	95	51	92	43
F 5025	96	67	96	53
WY 1122	97	72	--	--

Planted	May 17	May 18
Killed		August 23
Harvested	September 20	September 1
Fertilizer, lbs. per acre	120-180-180	120-120-120

Maine table 4. French fry color and texture indices for potato varieties grown at Presque Isle, 1960^{1/}.

Variety	Color index	Texture index
Antigo	5.1	1.0
Avon	5.1	1.0
Cobbler	6.1	1.0
Fundy	6.7	1.1
Golden Chip	4.9	1.0
Huron	7.0	1.0
Katahdin-A	5.6	1.0
Katahdin-B	5.7	1.0
Kennebec	4.5	1.0
Mohawk	6.2	1.0
Norland	5.3	1.0
Rushmore	6.1	1.0
Russet Sebago	5.3	1.0
B 2894-24	4.8	1.0
B 3454-5	6.7	1.0
B 3563-2	5.6	1.1
B 3570-5	6.6	1.0
B 3604-1	5.2	1.0
B 3696-13	6.0	1.0
B 3802-15	7.4	1.0
B 4121-7	6.3	1.1
B 766-E	5.4	1.0
F 5025	5.5	1.1
WY 1122	5.3	1.1
L.S.D. (0.05)	0.3	---
L.S.D. (0.01)	0.4	---

^{1/} French fries with the lower index numbers are lighter in color and lower texture indices indicate mealier texture.

Maine table 5. Chip color indices for potato varieties grown at three locations in Maine, 1960^{1/}.

Variety	Presque Isle	Exeter	Washburn
Antigo	5.3	5.4	4.8
Avon	5.1	5.1	5.3
Cobbler	6.1	6.5	7.2
Fundy	6.6	7.5	6.1
Golden Chip	5.0	5.3	5.1
Huron	8.5	8.6	7.3
Katahdin-A	6.2	5.1	5.2
Katahdin-B	5.5	5.6	5.5
Kennebec	5.0	5.3	5.9
Mohawk	6.6	7.3	6.2
Norland	5.3	5.6	5.6

continued

Maine table 5, continued.

Rushmore	6.1	5.4	6.2
Russet Sebago	5.9	6.2	5.8
B 2894-24	5.4	4.9	5.1
B 3454-5	7.8	6.7	5.8
B 3563-2	5.5	6.3	5.4
B 3570-5	6.8	---	---
B 3604-1	6.4	6.7	6.0
B 3696-13	6.3	6.1	6.3
B 3802-15	7.4	7.5	6.9
B 4093-18	---	---	8.0
B 4121-7	6.8	6.9	6.0
B 766-E	5.9	5.7	6.1
F 4613	---	6.4	---
F 5025	5.9	5.9	5.5
WY 1122	5.4	5.8	5.1
L.S.D. (0.05)	0.9	1.0	1.4
L.S.D. (0.01)	1.2	1.3	1.8

1/ 1 = very light: 10 = very dark

Color indices based on standard National Potato Chip color reference chart.

2/ French fry and chip color 1 = very light; 10 = very dark.

3/ French fry texture 1 = mealy; 3 = soggy.

MAINE

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Leafroll-Resistant Seedlings

In 1960 field testing for leafroll resistance was continued following the procedure outlined in Bulletin 502 of the Maine Agricultural Experiment Station.

This year, 6798 tubers from the greenhouse at Beltsville, Maryland, were planted on Aroostook Farm and tested for resistance to leafroll. Nineteen crosses were represented; for the first time in a number of years no selfed lines were available for this test.

In addition to the new seedlings and those saved from prior years for retesting, 168 selections from the Chapman Farm, representing selections from 123 different crosses and 26 named varieties, were included in 1960. Some of these selections come originally from breeding programs of various states and foreign countries.

All hills in the field test were read for current-season leafroll in August and those showing primary leafroll were eliminated from further consideration. Those hills not showing primary leafroll were saved for further testing. On this basis 376 hills (5.5% of the 6798 seedlings growing) were saved for replanting in 1961. Of the various selections from Chapman, 9 selections from as many different crosses, were saved because none of the 5 hills planted to each selection showed primary leafroll.

Healthy tubers of Green Mountain, Katahdin, Chippewa and Kennebec were planted at intervals over the field and the resulting plants were infested, at the same time as the plants being tested, with viruliferous green peach aphids. All of the plants growing from these previously healthy tubers showed distinct symptoms of primary leafroll in August. This indicates once again that the method of inoculation was effective with these varieties.

Results since the 1957 introductions are shown in Maine tables 6 through 13.

Maine table 6. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive seasons, 1958-1960.

Pedigree ^{1/}	Parentage	Not showing primary leafroll in August			Healthy ^{2/} in 1960
		1958	1959	1960	
		No.	No.	No.	No.
B 4449	X 927-3 x Katahdin	20/832	4/20	1/4	3/4
B 4451	X 927-3 x B 3556-12	5/90	1/5	1/1	0/1
B 4457	B 2834-3 x B 24-58	26/188	2/26	1/2	1/2
B 4466	B 3556-12 x (X96-56)	10/225	1/10	1/1	0/1

continued

Maine table 6, continued.

B 4471	B 24-58 x B 3945-12	5/254	1/5	0/1	1/1
B 4490	B 3391-2 x B 3556-12	19/81	5/19	4/5	3/5
B 4491	B 3391-2 x B 3944-11	16/428	1/16	1/1	1/1
B 4493	B 3397-17 x B 3556-12	7/24	1/7	1/1	0/1
B 4586	X 927-3 x B 294-38	5/202	1/5	0/1	0/1

- 1/ Seven crosses remaining out of 33 crosses and 3 selfed lines that were represented in 1958.
- 2/ Reading on 5-hill lots not infested in 1959 with viruliferous green peach aphids.

Maine table 7. Reactions of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculation with viruliferous green peach aphids in each of 3 successive years, 1957 through 1959.

Pedigree ^{1/}	Parentage	Not showing primary leafroll in August			Healthy ^{2/} in 1960
		1957	1958	1959	
		No.	No.	No.	No.
B 4236	Houma x B 24-58	63/267	31/63	13/31	7/13
B 4239	Houma x B 3556-12	91/426	37/91	13/37	5/13
B 4261	B 24-58 x B 3556-12	14/226	11/14	6/11	3/6
B 4264	B 24-78 x B 3556-12	86/486	62/86	26/62	16/26
B 4311	B 3302-68 x B 3556-12	23/475	13/23	3/13	2/2
B 4335	Houma x B 294-38	5/165	3/5	2/3	1/2
B 1522	B 3556-12 selfed	3/61	2/3	2/2	0/2

- 1/ Six crosses remaining out of 21 crosses and 1 selfed line that were represented in 1957.
- 2/ Not infested with viruliferous aphids in 1960 as a check to identify seedlings infected with but not showing primary symptoms after inoculation in 1959.

Maine table 8. Reaction of progenies of different crosses and selfed lines to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1960.

Pedigree ^{1/}	Parentage	Not showing primary leafroll in August		Surviving 2 inoculations	Healthy ^{2/} in 1960
		1959	1960		
		No.	No.	Pct.	No.
B 4749	B 3393-1 x B 24-58	30/523	27/30	5.2	23/30
B 4755	Ac 25813 x B 505-44	5/817	0/5	0	0/5
B 4776	A 180-26 x B 2834-3	5/214	5/5	2.3	4/5
B 4790	Ac 26025 x B 2834-3	17/444	12/17	2.7	9/17
B 4791	Ac 26025 x OB 2905-1	3/194	0/2	0	0/2
B 4793	Ac 26025 x B 4095-1	27/254	23/27	9.0	15/27
B 4794	Ac 26025 x B 4154-2	38/251	35/38	13.0	26/38
B 4803	B 294-29 x B 2834-3	4/94	4/4	4.3	4/4

continued

Maine table 8, continued

B 4836	B 3556-12 x (X 1276-185)	12/75	4/10	5.3	3/10
B 4843	B 4088-4 x B 4154-2	23/180	20/23	11.1	15/23
B 4848	X 927-3 x B 4154-2	12/271	8/12	3.0	4/12
B 4849	X 1276-185 x B 2834-3	13/345	9/12	2.6	8/12
B 4890	Katahdin x B 24-58	15/338	1/14	0.3	1/14
B 4891	Katahdin x B 2834-3	1/179	0/1	0	0/1
B 4893	B 24-58 x B 2834-3	35/484	29/35	6.0	23/35
B 1572	B 3672-4 selfed	67/365	0/67	0	6/67
B 1581	B 3397-17 selfed	31/237	29/31	12.2	24/31
B 1583	B 4154-2 selfed	6/223	6/6	3.1	6/6
B 1591	B 3556-12 selfed	11/372	9/10	2.4	8/10
B 1593	B 24-58 selfed	9/62	9/9	14.5	7/9
B 1594	B 2834-3 selfed	11/192	6/9	3.1	2/9

1/ Fifteen crosses and 6 selfed lines remaining out of 15 crosses and 7 selfed lines that were represented in 1959.

2/ Readings on 5-hill lots not infested in 1959 with viruliferous green peach aphids

Maine table 9. Reaction of progenies of 19 different crosses to leafroll infection resulting from artificial inoculations with viruliferous green peach aphids in 1960.

Pedigree	Parentage	Saved for retesting in 1961	Surviving the first year's inoculation
		No.	Pct.
B 4990	Ac 26025 x B 4154-2	0/39	0
B 4997	B 2834-3 x B 3556-12	3/310	1.0
B 4998	B 2834-3 x B 3646-11	1/290	0.3
B 4999	B 3097-82 x B 3391-2	1/180	0.5
B 5004	B 3391-2 x B 3556-12	17/530	3.2
B 5005	B 3391-2 x B 4154-2	2/254	0.8
B 5007	B 3397-17 x B 4168-5	14/340	4.1
B 5014	B 3556-12 x B 4087-5	3/189	1.6
B 5015	B 3556-12 x B 4154-2	19/501	3.8
B 5026	B 4087-5 x B 2834-3	3/245	1.2
B 5028	B 4095-1 x B 3556-12	66/552	12.0
B 5029	B 4095-1 x B 4168-4	41/304	13.5
B 5034	B 4154-2 x B 3391-2	41/604	6.8
B 5040	X 1276-185 x B 3556-12	94/876	10.7
B 5094	B 4095-7 x B 3556-12	12/152	7.9
B 5119	Houma x B 24-58	37/302	12.3
B 5120	Houma x B 2834-2	8/169	4.7
B 5148	B 3556-12 x B 3646-11	1/586	0.2
B 5153	B 4168-5 x B 3556-12	13/375	3.5
Totals		376/6798	5.5

Maine table 10. Reaction of certain progenies from Iowa breeding program to leafroll infection following inoculation with viruliferous green peach aphids in 1957, 1958, 1959 and 1960.

Pedigree	Parentage	Not showing primary leafroll in August				Saved in 1960 for retesting in 1961
		1957	1958	1959	1960	
		No.	No.	No.	No.	No.
I 55061	-	4/82	3/4	3/3	3/3	3/3

Maine table 11. Selections from Chapman in 1960 not showing current season symptoms of leafroll following inoculation with viruliferous green peach aphids.

Pedigree	Parentage	Showing primary leafroll
B 3299-13	B 936-12 x Katahdin	0/5
B 571-119	B 24-58 x Teton	0/5
B 859-10	X 1276-185 x Teton	0/5
B 2938-22	B 355-44 x B 522-33	0/5
B 3397-17	B 2113-9 x B 864-2	0/5
B 3556-12	B 595-76 x B 24-58	0/5
B 3725-1	Ac 25959 x (X 96-56)	0/5
B 3726-6	Ac 25959 x B 3160-12	0/5
4913-2	South Carolina seedling	0/5

Maine table 12. Yields and the reaction of 28 seedlings and three standard varieties to artificial infestation with viruliferous green peach aphids, 1960.

Variety	Parentage	Yield per acre ^{1/}	Showing primary leafroll in August ^{1/}
		Cwt.	Pct.
B 3563-2	(X927-3) x Katahdin	282.6	14
B 4491-12	B 3391-2 x B 3944-11	269.8	4
B 24-58	Imperia x Earlane	268.6	8
B 4343-2	B 2962-6 x ND 457-1	249.2	12
I 14150-5	(X1276-185) x Merrimack	247.7	40
B 4586-2	(X927-3) x B 294-38	244.8	20
B 4123-10	B 2925-23 x B 2359-84	242.8	0
B 3802-15	B 859-10 x B 24-58	241.0	2
B 3570-5	B 2834-3 x (X927-3)	237.8	14
B 3095-18	Houma x Triumph	233.8	12
B 4586-3	(X927-3) x B 294-38	231.7	26
B 4121-7	B2925-23 x B 294-38	228.0	14
B 4239-67	Houma x B 3556-12	226.5	8
X 1276-185	Houma x Katahdin	225.4	24
B 4239-25	Houma x B 3556-12	223.9	0
B 4145-2	Houma x B 3195-3	222.4	2
Kennebec		220.1	96
B 4116-1	B 2359-84 x B 2834-3	217.8	2

continued

Maine table 12, continued.

B 4239-46	Houma x B 3556-12	213.7	4
B 2971-14	B 574-14 x B 872-70	211.4	2
B 4116-3	B 2359-84 x B 2834-3	207.3	0
B 4239-23	Houma x B 3556-12	205.6	0
B 3850-2	B 2925-23 x B 2361-2	203.0	4
B 4273-18	B 595-76 x ND 457-1	196.3	2
Chippewa		193.7	100
I 1092-2	Teton x B 962-32	190.8	78
B 4261-10	B 24-58 x 3556-12	172.8	12
Katahdin		171.0	90
B 3299-13	B 936-12 x Katahdin	169.6	98
B 4154-4	B 24-58 x B 3195-3	168.1	44
B 4490-13	B 3391-2 x B 3556-12	164.4	0
L.S.D. 5%		22.7	
L.S.D. 1%		29.9	

1/ Average of 5 replications of 10 plants each.

Maine table 13. Yield, specific gravity, relative maturity and size distribution of ten leafroll-resistant seedling varieties and three standard varieties, 1960.

Variety	<u>1/</u> Yield	<u>2/</u> Specific gravity	<u>4/</u> Maturity	Percent yield 2½" dia. or above <u>3/</u>
Kennebec	326.1	1.098	M	87
B 3802-15	302.6	1.092	E	70
B 3559-53	296.6	1.098	M	58
Russet Burbank	294.0	1.091	M	34
Irish Cobbler	292.1	1.094	E	76
I 14150-5	285.5	1.093	M	71
Katahdin	283.1	1.094	M	75
B 4123-10	282.6	1.083	E	68
I 1092-2	282.0	1.098	M	70
B 3570-5	274.9	1.090	E	74
B 3563-2	269.8	1.103	M	76
B 2971-14	264.1	1.090	E	71
B 4121-7	234.1	1.090	M	86
B 3802-6	224.5	1.090	M-E	65
L.S.D. 5%	36.7	.004		
L.S.D. 1%	48.6	.005		

1/ Yield in cwt/A based on 5 replicated single row plots of 20 feet each.

2/ Based on samples from 4 replications.

3/ Based on the total yield from one replication.

4/ Average rating of 5 plots per entry one week before harvest.

E = Early; M = Medium; L = Late.

MAINE

F. E. Manzer, G. D. Easton, R. V. Akeley, A. E. Schark and Donald Merriam

Ring Rot Resistance Studies

Results of the annual screening trials for resistance to ring rot as previously described are reported one year behind since seedlings which are saved from the inoculation plot each year must be stored for several months before tuber examinations can be made. Therefore, the reactions of new seedlings inoculated with ring rot bacteria in 1959 are reported in Maine table 14.

Seedlings showing resistance to ring rot in previous tests are inoculated each year following their introduction unless discarded as undesirable. Of 113 seedlings which were retested in 1959, 17 were found to be susceptible and they are reported in Maine table 15. Seedlings not showing ring rot symptoms after inoculation in several successive years are tested to detect possible masked carriers of the disease.

The reaction of certain advanced selections from various programs and selected named varieties inoculated with ring rot bacteria in 1959 are shown in Maine table 16.

Each year ten advanced ring rot resistant selections from this program are compared with four standard varieties for yielding ability, specific gravity, size distribution and other agronomic characters. The results of this trial in 1959 are shown in Maine table 17.

Maine table 14. Reaction of different crosses to ring rot infection in 1959 introductions.

Pedigree	Parentage	No. seedlings tested	Field reading ^{1/}			Tuber examination ^{2/}		
			A	B	C	a	b	c
B 4448	B 902-2 x Saranac	12	4	1	7	5	-	-
B 4453	B 2098-5 x Menominee	8	1	1	6	1	1	-
B 4458	B 3102-3 x B 355-24	7	1	2	4	2	1	-
B 4459	B 3191-4 x B 3195-3	3	0	0	3	-	-	-
B 4468	47156 x B 3672-3	4	0	0	4	-	-	-
B 4475	B 606-37 x B 355-24	15	3	-	12	2	-	1
B 4483	B 2331-5 x B 3139-24	5	2	-	3	1	-	1
B 4484	B 2331-5 x B 3309-8	2	-	-	2	-	-	-
B 4485	B 3097-82 x B 3139-24	11	9	-	2	7	1	1
B 4486	B 3114-67 x B 3139-24	2	1	-	1	-	-	-
B 4488	B 3139-24 x B 2067-52	6	1	1	4	-	1	1
B 4489	B 3309-4 x B 3139-24	6	-	-	6	-	-	-
B 4495	B 3428-20 x B 3139-24	13	-	-	13	-	-	-
B 4497	B 3427-7 x B 3457-2	2	-	-	2	-	-	-
B 4508	B 3672-3 x Ac 26031	1	-	-	1	-	-	-
B 4509	B 3707-4 x Earlane	12	-	-	12	-	-	-
B 4511	B 3707-4 x Menominee	16	-	-	16	-	-	-

continued

Maine table 14, continued.

B 4522	B 922-6 x B 3139-24	13	-	-	13	-	-	-
B 4529	B 3428-20 x B 3944-11	17	-	-	17	-	-	-
B 4542	B 3819-3 x B 3556-2	5	1	-	4	-	1	-
B 4543	B 3964-1 x B 355-24	2	2	-	-	1	-	1
B 4544	41956 x B 606-3	5	-	-	5	-	-	-
B 4546	WV 14-17 x Menominee	10	-	-	10	-	-	-
B 4547	WV 14-17 x Merrimack	7	-	-	7	-	-	-
B 4552	WV 14-17 x B 3114-67	11	6	-	5	1	4	1
B 4557	WV 14-17 x B 3944-11	4	-	-	4	-	-	-
B 4574	B 922-3 x B 3139-24	16	-	-	15	-	-	1
B 4590	Pontiac x B 2368-4	1	-	-	1	-	-	-
B 4591	LaSoda x B 2368-4	19	-	-	19	-	-	-
B 4601	B 991-14 x Teton	33	2	2	29	-	-	4
B 4602	B 1268-26 x A 144-1	5	-	-	5	-	-	-
B 4603	B 2331-5 x B 2997-9	1	-	-	1	-	-	-
B 4608	B 3114-12 x B 2131-3	40	-	-	40	-	-	-
B 4616	B 3139-24 x Katahdin	17	-	-	17	-	-	-
B 4617	B 792-8 x B 139-24	6	1	1	4	1	1	-
B 4618	Sebago x 47156	6	-	-	6	-	-	-
Katahdin Checks ^{3/}		68	-	4	64	-	-	4

1/ Based on 5 inoculated seed pieces for each seedling.

A = Number of seedlings having none of the hills showing ring rot symptoms.

B = " " " " one " " " " " " " "

C = " " " " two or more " " " " " "

2/ All tubers from each seedling having none or only one of the five plants showing ring rot symptoms were stored for 6 months, snipped and examined for ring rot symptoms.

a = Number of seedlings having none of the tubers showing ring rot symptoms.

b = " " " " less than 10% " " " " "

c = " " " " 10-100% " " " " "

3/ Inoculated five-hill lots spaced at intervals throughout the test.

Maine table 15. Seedlings, previously reported as ring rot resistant, showing susceptibility after reinoculation in 1959^{1/}.

Pedigree	Parentage	Field reading	2/ Tuber examination	3/
B 4245-12	Merrimack x Ac 26032	0/5	10/47	
B 4285-10	B 725-61 x Merrimack	2/5	-	
B 4285-15	B 725-61 x Merrimack	3/5	-	
B 4286-11	B 725-61 x B 3139-24	2/5	-	
B 4286-13	B 725-61 x B 3139-24	0/5	1/50	
B 4286-40	B 725-61 x B 3139-24	0/5	3/26	
B 4289-11	B 902-2 x Merrimack	0/5	1/32	
B 4290-5	B 902-2 x B 3139-24	1/5	5/56	
B 4291-8	B 922-3 x B 3556-12	2/5	-	
B 4294-1	B 929-32 x B 3139-24	2/5	-	
B 4305-9	B 3097-82 x B 3299-13	0/5	1/81	
B 4306-2	B 3139-24 x B 3556-12	4/5	-	

continued

Maine table 15, continued.

B 4321-8	B 3707-4 x B 3139-24	1/5	1/32
B 3876-6	B 3097-82 x B 3139-24	1/5	1/32
B 3600-18	B 3021-3 x Katahdin	0/5	1/19
B 3604-1	Saranac x B 2395-14	2/5	-
B 3352-4	Saranac x Teton	2/5	-
Katahdin Checks ^{4/}		109/115	-

1/ From a total of 179 seedlings reported as being ring rot resistant in 1959, 66 were discarded as undesirable and the remaining 113 were retested.

2/ Five seed pieces for each seedling.

3/ All tubers from each seedling having none or only one of the hills showing ring rot symptoms were saved and snipped.

4/ Inoculated five-hill lots spaced at intervals throughout the test.

Maine table 16. Susceptibility of selected seedlings and name varieties to ring rot infection in 1959.

Variety	Parentage	Field reading ^{1/}	Tuber examination ^{2/}
Excel		5/5	-
Haig		5/5	-
Houma		5/5	-
Katahdin		5/5	-
Kennebec		5/5	-
LaSoda		5/5	-
Menominee		3/5	-
Merrimack		0/5	9/30
Ontario		4/5	-
Pontiac		5/5	-
Red Bake		5/5	-
Saco		5/5	-
Saranac		2/5	-
Sebago		2/5	-
Sequoia		2/5	-
Teton		2/5	-
Triumph		5/5	-
B 319-30	Earlaine x (X336-144)	5/5	-
B 345-2	(X96-28) x (X336-144)	5/5	-
B 3454-5	B 2368-2 x B 2368-17	5/5	-
B 3692-4	B 2919-1 x Ac 25953	5/5	-
B 3696-13	B 3097-16 x Ac 25959	2/5	-
B 3725-1	Ac 25959 x (X96-56)	5/5	-
Wy 1122	No known	0/5	-
PI 214372, S	Sturgeon Bay	4/5	-
B 2997-9	B 874-15 x Ruska	5/5	-
B 400-1	499-A x B 56-11	2/5	-
B 2131-3	B 56-1 x B 594-46	5/5	-

continued

Maine table 16, continued.

B 3299-13	B 936-12 x Katahdin	5/5	-
B 606-37	41956 x 96-56	2/5	-
Ac 26031	Not known	2/5	-
Ac 26033	Not known	3/5	-
B 926-9	B 66-1 x X792-94	4/5	-
B 922-3	PI-5 x B 355-24	5/5	-
B 922-6	PI-5 x B 355-24	5/5	-
B 936-12	X792-94 x B 294-38	3/5	-
B 91-3	Sebago x X528-170	5/5	-
B 3097-82	Kennebec x B 991-13	1/5	1/24
B 3139-24	B 607-56 x B 402-1	0/5	0/26
B 3418-10	Menominee x B 881-12	5/5	-
B 3719-1	Ac 25953 x B 2331-5	3/5	-
B 1466-27	B 2067-2 x Selfed	5/5	-
B 1467-8	B 2331-5 Selfed	0/5	2/26
B 595-76	41956 x B 61-3	2/5	-
B 2894-24	Kennebec x Teton	3/5	-
B 3140-36	B607-72 x B962-32	1/5	2/24
Katahdin Checks ^{3/}		42/50	-

1/ Five seed pieces for each seedling.

2/ All tubers from each seedling having none or only one of the hills showing ring rot symptoms were saved and snipped.

3/ Inoculated five-hill lots spaced at intervals throughout the test.

Maine table 17. Yield specific gravity, size distribution and relative maturity of ten ring-rot resistant seedling varieties and four standard varieties.

Variety	Yield ^{1/}	Specific gravity ^{2/}	Per cent yield 2½" or above ^{3/}	Maturity ^{4/}
Kennebec	326.1	1.098	87	M
Wy 1122	318.1	1.087	90	M
Russet Burbank	294.0	1.091	34	M
B 3478-45	292.6	1.086	79	E
Irish Cobbler	292.1	1.094	76	E
B 3478-22	288.2	1.093	69	M
Katahdin	283.1	1.094	75	M
B 725-61	280.7	1.088	78	M
B 721-29	270.4	1.098	67	L
B 3353-16	256.1	1.093	83	M
B 3922-1	247.3	1.089	46	L
B 766-E	245.8	1.086	55	E
B 911-21	244.7	1.090	76	M
B 909-2	184.4	1.077	17	L
L.S.D. 5%	36.7	.004		
L.S.D. 1%	48.6	.005		

1/ Yield in cwt/A. based on five replicated single-row plots of 20 feet each.

2/ Based on samples from four replications.

3/ Based on the total yield from one replication.

4/ Average rating one week before harvest on five plots per entry.

E, Early; M, Medium; L, Late.

MASSACHUSETTS

Martin E. Weeks and David Field

Twenty-three varieties of potatoes were tested at the Massachusetts Agricultural Experiment Station during the 1960 season. The tests were in cooperation with the National Potato Breeding Program, Agricultural Research Service, U. S. Department of Agriculture.

Varieties were tested in plots 25' x 24' replicated 4 times. Four center rows were harvested for yield. The rows were spaced 36 inches apart with seed pieces averaging 1½ oz. spaced 10 inches apart in the row. Planting date was May 6 with harvesting 140 days later on September 23. Fertilizer treatment, 1500 lbs. per acre of 10-10-10-2, side dressed with 25 lb. N on June 14.

Plants were sprayed weekly with Dieldrin when 25-50% of the plants emerged. This was changed to Methoxychlor and later to Malathion. Parzate was added to the sprays in mid-June. The vines were killed September 1. Rainfall during the growing season was 23.65 inches. Yield data is presented in Massachusetts table 1.

After harvesting varieties were checked for chipping quality and color rating (last column in Table) was recorded by a standard test method. Color ratings obtained three weeks after harvest and before the tubers went into cold storage. Ratings range from 1 to 10 with lower ratings being the lighter chips and higher ratings darker.

In Massachusetts table 2 the average yield for certain of the varieties for a period of up to five years are shown. These data cannot be compared directly because for some varieties results are shown from one to three years only. However, it is felt the presentation of the data is worthwhile to give an idea of the yield potential of the varieties. The numbered varieties are not listed because the numbers have changed from year to year.

Massachusetts table 1.--Potato Variety Trials grown at Massachusetts Agricultural Experiment Station, 1960.

Variety	Average Yield Per Acre Cwt.	Size B Tubers Pct.	Total Solids Pct.	Quality Rank	Color Rating of Chips
Red B 2368-4	451.6	4.6	19.7	5	9
Green Mountain	431.2	1.3	20.5	2	
Onaway	403.7	1.3	17.8	12	9
Pungo	389.1	2.1	18.3	11	8
Houma	388.4	4.4	19.7	6	9
Chippewa	372.4	5.3	17.1	17	7
Huron	369.5	6.3	20.1	3	9
B 3653-15	359.3	5.6	18.9	8	9
Irish Cobbler	349.2	3.4	19.1	7	7
Plymouth	347.0	0.6	17.6	16	6
Katahdin	341.9	2.4	18.6	10	6

continued

Massachusetts table 1, continued.

B 2187-25	332.5	3.4	16.1	22	
B 3299-13	331.1	2.2	17.8	13	
B 3095-18	328.9	5.5	18.8	9	7
B 3837-11	303.5	8.4	17.0	18	
F 4613	296.2	1.8	17.8	14	
B 3604-19	275.9	3.0	16.9	20	
Delus	267.2	1.7	20.0	4	7
B 4093-18	249.7	1.5	16.3	21	
Merrimack	236.0	2.9	20.8	1	
Red B 3309-4	234.5	10.9	-	23	
Wy 1122	227.2	2.0	16.8	19	6
Warba	222.2	3.1	17.7	15	
L.S.D.	.05	57.7 cwt per acre			
L.S.D.	.01	76.5 cwt per acre			

Massachusetts table 2. Potato Variety Yield Averages for Five Years on Campus.

Variety	1960	1959	1958	1957	1956	X
Green Mountain	431	260	222	355	222	298
Katahdin	342	275	-	231	310	290
Merrimack	236	230	249	153	-	217
Warba	222	-	224	-	-	223
Chippewa	372	-	-	-	-	372
Plymouth	347	243	272	162	148	234
Huron	370	-	246	-	-	308
Pungo	389	221	183	280	241	263
Irish Cobbler	349	267	-	159	280	264
Houma	388	-	-	284	267	313
Onaway	404	-	-	-	-	404
Delus	267	181	257	208	289	240
Saco	-	348	245	385	241	305
Teton	-	192	250	269	315	257
Russett Burbank	-	148	214	215	278	214
Sebago	-	218	203	204	142	192
Kennebec	-	-	291	227	223	247

Massachusetts table 3. Yield in hundred weights per acre, quality and chip color ratings on eleven potato varieties grown in single plots on Farms A and B in Hampshire and Franklin Counties respectively by Massachusetts Agricultural Experiment Station and Extension Service, 1960.

Variety	FARM A **				FARM B **			
	Ave.	Size B	Total D.M.	Chip	Ave.	Size B	Total D.M.	Chip
	Yield	Tubers	Solids	Color rating	yield	Tubers	Solids	Color rating
	Cwt.	Pct.	Pct.		Cwt.	Pct.	Pct.	
Plymouth	327	3.6	18.7	4				
Green Mountain	309	4.2	19.9	-	194	9.8	17.4	5
Kennebec	262	6.4	19.7	4				
Huron	254	5.8	18.7	9	177	16.9	-	-
Pungo	231	3.4	18.9	4	460	3.5	18.5	5

continued

Massachusetts table 3, continued.

Onaway	231	9.3	19.0	3.5				
B 3604-19	221	5.6	17.7	7	352	2.8	15.6	
Delus	250	3.2	-	4	145	4.0	18.5	7
Irish Cobbler	199	5.3	17.8	8	326	9.6	17.0	7
Merrimack	177	4.4	19.9	5	270	1.4	21.0	4
Katahdin	153	4.1	18.9	4	351	3.3	16.7	6
Houma					236	7.0	17.5	8

** Farm A--row spacing 34" at 4" to 6" in row. Planting date May 11, harvested September 8. Fertilizer used 5-10-10-2 at 1500 lb. per acre. Farmers' spray schedule.

Farm B--row spacing 36" at 10" in row. Planting date May 16. Harvested September 8-9. Fertilizer used 8-12-12-2 at 1500 lbs. per acre at planting plus two units liquid nitrogen.

Massachusetts table 4. Potato Vine Killing Tests, Farm A, Worthington, Massachusetts, 1960.

Variety	Application of Sodium Arsenite at	
	1 Application per acre *	2 Applications per acre *
	Cwt per acre	Cwt per acre
Green Mountain	312	307
Chippewa	299	259
Katahdin	256	238
Average	289	268

* Used at rate of 1½ gallons per acre.

Massachusetts table 5. Potato Nitrogen Trials, Farm B, Sunderland, Massachusetts, 1960.

Variety	Katahdin	Irish Cobbler	Green Mountain	Warba	Chippewa
<u>125# N/acre</u>					
Yield	329	300	253	212	206
Size B tubers %	4.8	7.4	4.5	4.6	4.7
Specific Gravity	1.0655	1.069	1.075		1.061
<u>150# N/acre</u>					
Yield	395	282	346	222	
Size B tubers %	3.9	4.1	3.8	4.5	
Specific Gravity		1.064	1.072		
<u>160# N/acre (Field rate used on farm)</u>					
Yield	351	326	-	-	-
Size B tubers	3.3	9.6	-	-	-
Specific Gravity	-	-	-	-	-
<u>200# N/acre</u>					
Yield	332	321	355	245	-
Size B tubers	4.3	4.6	3.2	3.5	-
Specific Gravity	1.06	1.065	1.076	1.065	-

1960 Cooperative Farm Tests

Variety tests, vine killing tests and nitrogen rate tests were conducted on two farms--one in the Worthington area in Western Hampshire County in the Berkshire Hills (Farm A) on the Ben Albert farm and the other in the Connecticut Valley (Farm B) on the Charles Warner Farm.

Tests under direction of Martin E. Weeks and David Field with aid of Walter Melnick, County Agent Manager, Hampshire County Extension Service and D. L. Thayer, Franklin County Extension Agent. Cooperating growers were Mr. Ben Albert, Worthington (Farm A), Hampshire County and Mr. Charles Warner, Sunderland (Farm B), Franklin County.

MASSACHUSETTS
Robert A. Mullany

1960 Potato Yield Tests

Three potato yield tests were planted in Eastern States' territory in 1960; one in Massachusetts and two in Pennsylvania, each test being located in concentrated potato growing areas. The tests were planted in commercial growers' potato fields and, with the exception of planting, were treated culturally as their own. The experimental design was the randomized complete block, with four replicates at each location. Individual plots consisted of one 25-foot row with 10-inch spacing between plants. Sprayer rows were not involved in these tests, with the exception of the Oxford trial. A late blight infection in June necessitated cutting down on the number of rows covered by a mist blower at this location, resulting in some trial rows being affected. Minor yield adjustments were made with these rows. Test locations, and the fertilizer and previous cropping practices followed by each cooperator are noted below.

The farm of Fred Oswald, New Tripoli, Pennsylvania, has a shaly loam soil characteristic of some areas of Lehigh County. The previous year's crop was a clover-grass mixture in a potato-wheat-hay rotation. The heavy sod had been top-dressed with 500 pounds per acre of 15-10-10 the previous July. Twelve tons of manure was plowed down, with 800 pounds per acre of 10-20-10 banded in 34-inch rows. The test planting date was May 6 and the harvest date October 10.

The Norman Whiteside test was planted in heavy loam soil in the town of Oxford, Lancaster County, Pennsylvania. Potatoes were preceded by clover and wheat respectively. Ten tons of manure was plowed down with the clover sod and 2300 pounds per acre of 5-10-10 was applied with the planter in 32-inch rows. This test was planted on April 21 and harvested September 27.

Clark Bros. farm in Westfield, Massachusetts, had a sandy loam soil type. Previous cropping was potatoes, followed by a ryegrass cover crop. Fifteen hundred pounds per acre of 10-15-15 was applied in 34-inch rows by the planter. The planting date was May 16 and the harvest date October 5.

The yields of the tests in Pennsylvania were unusually high as a result of generally ideal growing conditions, with lower temperatures and higher moisture levels than normal. The yield data from the Oxford, Pennsylvania, test was complicated by an uneven spread of late blight in the trials. Yields at Westfield, Massachusetts, were affected somewhat by a shortage of water the latter part of August and the early part of September, after good growing conditions earlier.

All Katahdin and Chippewa entries and the Huron variety were from Eastern States' stocks. The remaining entries were provided by Dr. A. E. Schark of the USDA (Maine).

There was no significant difference in yield between the different Katahdin stocks used. However, it should be noted that the "Katahdin Regular" entry (so named because it was representative of regular Eastern States distribution stocks in 1959), had an average Virus X level of only seven percent. It is

significant that the Katahdin X-free and the Katahdin weak-X yields were comparable, since a weak-X program may be the more practical method of nullifying the virus X effect. A tendency, as noted in previous work, for weak-X Chippewas to yield better than regular distribution stocks of Chippewas was not borne out by the 1960 data.

Other notes of interest follow: Seedling B 3696-13 was the only entry in the Oxford test that did not have active blight on July 28. However, this seedling did tend to be "knobby." The entry with the highest total solids, seedling I 8140-1, produced netted tubers susceptible to growth cracks. This seedling had characteristic "red-eyes." Seedling F 5025 showed a definite tendency to go to undesirable pear shapes. F 4713 (Avon) was down slightly in yield and was somewhat rough at several locations, which was also true of seedling B 751-119.

The chipping data recorded in Eastern States table 2 was compiled by processing representative samples from the Westfield, Massachusetts, test through the commercial chipping operation of the State Line Potato Chip Company of Wilbraham, Massachusetts. F 4713 (Avon) was outstanding in producing light-colored chips, followed closely by F 4613 and B 2894-24.

Extensive chipping data on the entries in both tests in Pennsylvania was supplied through the cooperation of James Watts of the Wise Potato Chip Company of Berwick, Pennsylvania. This data suggests that further work with I 8140, F 4713 (Avon), F 4613, and B 751-119 in that order, is warranted. This is based on producing chips of acceptable color over an extended period, as well as at harvest.

Eastern States table 1. Yield of US No. 1 tubers and percent defects*, 1960.

Entry	New Tripoli, Pa.			Oxford, Pa.			Westfield, Mass.			Ave. US
	US No. 1		Defect	US No. 1		Defect	US No. 1		Defect	No. 1 Yield
	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.
Katahdin X-free	519	95	0.0	531	93	1.5	381	94	0.2	477
Katahdin Regular	479	92	0.2	491	94	0.6	399	93	0.0	456
Katahdin weak-X	501	93	0.0	558	94	0.7	390	94	0.0	483
Chippewa Regular	402	91	0.1	464	90	0.9	395	93	0.3	420
Chippewa weak-X	398	92	0.7	424	89	0.0	368	93	0.5	397
F 4613	368	92	1.7	439	93	1.2	325	93	1.0	377
F 4713 (Avon)	334	92	2.6	410	94	1.4	291	92	0.6	345
F 5025	265	80	2.8	342	72	13.3	289	84	1.4	299
B 3696-13	288	88	1.5	434	88	1.7	320	91	1.9	347
B 3309-8	241	80	3.8	275	73	8.2	308	84	8.3	275
I 8140-1	207	77	11.4	280	85	5.4	-	-	-	-
B 751-119	309	83	1.9	421	87	0.4	-	-	-	-
B 2894-24	-	-	-	-	-	-	382	92	2.2	-
Huron	-	-	-	-	-	-	367	86	3.5	-
L.S.D.	.05	44		94			55			34

* Defects include growth cracks and off-types only.

Eastern States table 2. Total solids and chip color rating*, 1960

Entry	New Tripoli, Pa.		Oxford, Pa.		Westfield, Massachusetts	
	Total solids		Total solids		Total solids	Chip color
	Pct.		Pct.		Pct.	
Katahdin X-free	17.0		15.8		18.6	-
Katahdin Regular	17.1		16.2		18.2	2
Katahdin weak-X	16.8		16.0		18.0	-
Chippewa Regular	16.5		15.3		16.6	1
Chippewa weak-X	16.8		15.2		16.6	-
F 4613	16.4		16.0		17.9	3
F 4713 (Avon)	18.2		16.4		18.7	4
F 5025	18.0		18.1		19.1	2
B 3696-13	17.5		18.0		18.5	2
B 3309-8	16.6		14.9		15.6	2
I 8140-1	20.0		18.5		-	-
B 751-119	19.0		17.3		-	-
B 2894-24	-		-		17.8	3
Huron	-		-		19.1	1
L.S.D. .05	.55		.69		1.2	

* Chip color rating code: 1 = poor, 2 = fair, 3 = good, 4 = excellent.

MICHIGAN

W. J. Hooker, D. R. Isleib, and N. R. Thompson

Potato improvement is a cooperative program between the Department of Farm Crops and the Department of Botany and Plant Pathology, Michigan State University. Forty-thousand seedlings from controlled crosses were screened for immunity to virus X and late blight. The resistant seedlings were increased in the greenhouse for field planting.

Three-hundred and nine advanced selections were evaluated at the Lake City Experiment Station and one hundred and eighty-two at the M. S. U. Muck Farm. Overstate yield trials were conducted at seven locations on mineral soil and two locations on organic soil (Michigan table 1).

To identify varieties satisfactory for chipping in mid-summer, fourteen varieties and seedlings were tested in the early section of Lapeer County (Michigan table 2). Three new varieties have been increased in the Foundation seed program and distributed to certified seed growers. Two seedlings, Ia IIII-5 and Ia IIII-8, from the Cooperative USDA project in Iowa are being considered for release jointly by Michigan, Iowa, and the USDA. The third R 123-9 is from the Michigan program.

Ia IIII-5. A virus X immune, blight and scab resistant seedling which matures in the Katahdin class. The tubers are white, smooth shallow eyed slightly longer than wide with average dry matter. The yield potential is high with a heavy set of tubers, indicating the need for high fertility and moisture. Chipping characteristics are similar to Sebago.

Ia IIII-8. A virus X immune, blight and scab resistant seedling which matures in the Katahdin class. The tubers are white, round, and smooth with shallow eyes and high in dry matter. The yield is average with a high percentage of U. S. #1 tubers. Chipping characteristics are excellent.

Michigan table 1. Average yield and specific gravity of potato varieties and seedlings, Michigan Overstate Potato Variety Trials, 1960.

Variety	7 Mineral Soils		2 Organic Soils	
	Yield	Sp. Gr.	Yield	Sp. Gr.
	Cwt.		Cwt.	
Kennebec	330	1.080	283	1.076
Excel	304	1.081	283	1.079
R. Rural	302	1.080	202	1.090
Avon	276	1.078	254	1.077
Sebago	264	1.071	295	1.072
Onaway	252	1.069	244	1.070
Ia IIII-8 **	248	1.085	245	1.083
Merrimack	243	1.083	314	1.087
Katahdin	241	1.074	313	1.074
Keswick	240	1.079	209	1.080
Huron	239	1.076	349	1.079
Norland	212	1.066	176	1.064
Ia IIII-5 **	197	1.073	191	1.077
Cherokee	191	1.074	214	1.073
Mean	253	1.076	258	1.077

** Yield data not corrected to compensate for poor stand.

1/ Increase in yield of No. 1 potatoes 10% or more of the yield at first harvest probably indicate that full size of tubers and yield increased between July 29 and August 15. Apparent decreases in yield probably result from the selection occurring on a better soil in replication 1 than in the remaining 3 replications. (Replication differences were highly significant--replications 1 and 4 yielded 266 and 258 cwt., respectively, while replications 2 and 3 yielded 307 and 298 cwt. respectively).

R 123-9. A scab and blight resistant potato adapted to the northern sections of the State. It matures in the Russet Rural class. The tubers are creamy white, round, and slightly flattened. The yield potential in a cool season is high.

Early harvest potato seedling chip test, Lapeer County. Yield, specific gravity, and chip quality from the seedling potato trial conducted in Lapeer County are shown in the following table. This plot was planted April 28. It was irrigated 4 times with a total of 6 inches of water. The first replication was dug July 29, but specific gravity of these samples could not be taken until August 5. Apparently some loss of water occurred, causing the specific gravity readings to be abnormally high. The remaining three replications were dug August 15 and specific gravity determinations made on August 17. Chip samples in both harvest dates were made on the day of digging.

Michigan table 2. Yield, specific gravity, and chipping quality of 15 potato varieties and seedlings grown in Lapeer County, 1960. (Yields in cwt. US No. 1 tubers per acre).

Seedling or Variety	Harvest July 29				Harvest August 15				Mean yield both harv.
	Yield (1 rep.)	Sp. Gr.	Chip Color	Yield (3 reps.)	Sp. Gr.	Chip Color	Yield increase in 17 days ^{1/}		
484-16C	287	1.070	poor	349	1.067	poor	+ 62	334	
483-33L	341	1.067	good	331	1.066	fair	- 10	334	
430-1L	370	1.066	poor	312	1.061	poor	- 58	327	
425-2L	301	1.078	good	329	1.075	excellent	+28	322	
R 334-1	290	1.075	poor	318	1.072	fair	+28	311	
Avon	243	1.083	excellent	333	1.076	fair	+90	310	
1111-8	272	1.086	good	365	1.084	good	+93	306	
Keswick	254	1.074	poor	294	1.077	fair	+40	284	
1111-5	272	1.079	good	256	1.075	good	-16	260	
1111-20	214	1.079	good	272	1.077	excellent	+58	258	
416-20C	261	1.077	good	255	1.074	good	-6	257	
Tawa	160	1.068	fair	239	1.070	fair	+79	220	
1111-2	236	1.070	good	203	1.067	good	-33	211	
1346-17 M	145	1.065	fair	189	1.072	excellent	+44	180	
L. S. D.							.05	97	
							.01	134	

Inbreeding for immunity to virus X.--Seed obtained from selfing X immune plants derived from S. 41956 was planted in flats and transplanted to 3-inch pots. When plants were 4 inches high they were mechanically inoculated with potato virus X, isolate X5, with inoculum grown in Nicotiana glutinosa. They were dusted with 400 mesh carborundum and inoculated by dipping the fingers in the inoculum and rubbing all the leaves with the fingers. The inoculation was

carried out 3 times at intervals of about two days. After about two weeks from the time of first inoculation, 3 leaflets were taken from the lower, middle and upper portions of the potato plants, folded with sterilized forceps and rubbed on two half leaves of Gomphrena globosa. After 7 days, G. globosa leaves were examined for lesions. The potato plant was considered susceptible to virus X (Xs) if it reproduced over 20 lesions in each of the two half leaves of G. globosa, and immune to virus X (Xi) if it produced no lesions. Those plants that produced few, between 1 and 20, lesions of G. globosa were rubbed a second time on other G. globosa plants to obtain additional information concerning the virus titre of the plants. Individual plants were rated immune or susceptible to virus X (Michigan table 3).

The majority of the seedling plants fell into 2 groups, either susceptible or immune. A small number of plants, those indicated as susceptible-atypical, developed a low virus titre on the first observation and later the titre became typical of other plants of the susceptible population. Another group, ~~immune~~-atypical, had a very low virus titre at the first observation and a negative reaction on the second observation. When typical virus X immune individual plants were evaluated a second time, results were in agreement with the original classification.

It is significant that frequency of immunity to virus X in segregating progenies was markedly increased by as little as 2 generations of selfing plants immune to the virus.

Michigan table 3. Segregating of immunity to virus X in potato progenies in the S₁ and S₂ generations.

Generation	Progeny, parentage, and resistance to virus X ₁ /		Plants tested	typical		atypical		total		typical		atypical		total	
				No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	Pct.	No.
S ₁	MS 577 Ia 1114-2 self Xi		80	12	- 2/	12	15.0	68	68	- 2/	68	85.0			
S ₁	MS 638 Ia 1114-2 self Xi		28	6	0	6	21.5	22	22	0	22	78.5			
F ₁	MS 826 Ia 1114-2 X Ia														
	872-4 Xi x Xs		93	56	2	58	63.0	30	30	4	34	37.0			
S ₂	MS 655 MS 577-13 self Xi		60	11	0	11	18.4	47	47	2	49	81.6			
S ₂	MS 647 MS 577-29 self Xi		77	1	0	1	1.3	72	72	4	76*	98.7			
S ₂	MS 657 MS 577-37 self Xi		19	0	0	0	0	19	19	0	19	100.0			
S ₂	MS 658 MS 577-39 self Xi		36	0	0	0	0	36	36	0	36	100.0			
S ₂	MS 648 MS 577-52 self Xi		28	6	0	6	21.3	22	22	0	22	78.7			
S ₂	MS 648 MS 577-52 self Xi		16	4	0	4	25.0	12	12	0	12	75.0			
S ₂	MS 659 MS 577-57 self Xi		17	1	0	1*	5.9	16	16	0	16	94.1			
S ₂	MS 649 MS 577-68 self Xi		26	1	0	1	3.9	24	24	1	25	96.1			
S ₂	MS 649 MS 577-68 self Xi		33	1	0	1	3.0	32	32	0	32	97.0			
S ₁	MS 571 Ia 902-7 self Xi		68	21	- 2/	21	30.9	47	47	- 2/	47	69.1			
S ₂	MS 644 MS 571-29 self Xi		65	2	0	2	3.1	58	58	5	63	96.9			
S ₂	MS 645 MS 571-37 self Xi		73	0	0	0	0	64	64	9	73	100.0			
S ₂	MS 646 MS 571-39 self Xi		41	0	0	0	0	30	30	11	41	100.0			
S ₂	MS 654 MS 571-53 self Xi		24	0	0	0	0	24	24	0	24	100.0			
S ₁	MS 569 Ia 902-2 self Xi		41	19	- 2/	19	46.3	22	22	- 2/	22	53.7			
S ₂	MS 642 MS 569-19 self Xi		21	0	0	0	0	21	21	0	21	100.0			
S ₂	MS 652 MS 569-20 self Xi		7	0	0	0	0	7	7	0	7	100.0			
S ₂	MS 643 MS 569-26 self Xi		27	0	0	0	0	27	27	0	27	100.0			
F ₁	MS 561 Ac 2566-8xIa 1107-4														
	Xs x Xi		101	41	- 2/	41	40.6	60	60	- 2/	60	59.4			
S ₁	MS 650 MS 561-51 self Xi		7	0	0	0	0	7	7	0	7	100.0			

1/ Resistance to virus X indicated as Xi, immune, and Xs, susceptible.

2/ Early tests were not designed to identify individuals with atypical reaction.

MINNESOTA

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The work carried out in 1960 was a continuation of the potato breeding program described in previous report. The combining of factors controlling adaptation, market and table qualities, and resistance to common scab, late blight and virus X is being emphasized. Seedling progenies were screened at Crookston, Minnesota. Selections in preliminary adaptation and adaptation trials were screened at five locations. Potato variety trials were conducted at six locations. Tests for resistance to common scab were made at Grand Rapids, Minnesota, and for field resistance to late blight at Duluth, Minnesota.

The reaction to scab of 2949 seedling clones derived from 292 crosses is summarized in Minnesota table 1. A total of 170 parents were used in the 292 crosses. Of these, 109 had scab resistant ancestry while the remaining 61 had no scab resistant ancestry. The scab resistance of the former was estimated on the basis of at least 3 or more years of data. Of these, 32, 30, 31 and 16 had highest scab ratings of 2, 3, 4, and 5, respectively. Parent clones with no scab resistant ancestry were not tested for resistance. The ratings for scab resistance are based on the "highest scab" method described earlier by Leach et al. Five pustule types are recognized with type 1 representing the most resistant class and type 5 (pitted scab) the most susceptible class. According to this method of evaluation, the clones are rated by the most susceptible type of pustule found in any year. Thus a rating of 3 indicates that the most severe pustule observed in any of the tests as a type 3 pustule. The seedling clones tested were derived from a variety of different types of progenies including selfs, sibs, and hybrids from crosses of inbred or non-inbred by inbred or non-inbred parents. These were second clonal generation materials and since the majority were discarded the following year, the resistance ratings are based on one year's data. The extent of tuber surface affected by scab was not considered. It is apparent, on the basis of the mean scab index of the seedling clones, that the parents can be separated into 3 groups relative to combining ability. Parents with ratings of 2 or 3 were similar to each other and most effective, those with ratings of 4 or 5 (scab resistant ancestry) were similar to each other and intermediate in effectiveness, and those with no scab resistant ancestry were least effective.

Minnesota table 1. Reaction to scab of seedling clones from crosses of parents in clonal resistance.

Highest scab rating of parents ^{1/}	Progenies	Seedling clones tested	Number of seedling clones in indicated classes of scab resistance					Mean scab index
			1	2	3	4	5	
2 and 2	No. 10	No. 145	27	68	34	10	6	2.31
2 3	10	43	6	21	13	2	1	2.33
2 4	12	96	4	31	26	29	6	3.02
2 5	14	155	16	46	59	27	7	2.79
2 5 ₂ /	48	473	17	73	127	132	124	3.58

continued

Minnesota table 1, continued.

3 and 3	23	292	31	136	92	25	8	2.46
3 4	21	173	19	48	56	30	20	2.91
3 5	35	320	21	78	124	71	26	3.01
3 5 ² / ₁	39	506	4	51	179	141	131	3.68
4 4	33	362	8	65	95	124	70	3.51
4 5	11	111	1	14	36	44	16	3.54
4 5 ² / ₁	9	35		2	5	10	18	4.26
5 5	13	109	2	20	31	40	16	3.44
5 5 ² / ₁	8	62	2	5	24	14	17	3.63
5 ² / ₁ 5 ² / ₁	6	67		3	15	20	29	4.12

1/Scale, 1 - 5: 1, very small and superficial; 5, pitted scab.

2/Clones with no scab resistant ancestry.

To better understand the nature of field resistance to late blight and perhaps devise quicker and cheaper tests for such resistance, studies have been made of characters that possibly are related to field resistance. Seed of new selections with demonstrated field resistance has not been available in sufficient quantity so standard varieties were studied. These were Irish Cobbler, Pontiac, Sebago and Ostbote, having increasing degrees of field resistance in the order named. In general the results of these studies indicated that in Pontiac, Sebago and Ostbote a higher degree of field resistance is associated with fewer lesions resulting from standard amounts of inoculum, and limited sporulation under standard conditions. The amount of infection of these varieties could be increased by slight injury of the leaves. In contrast, the Irish Cobbler variety, although relatively susceptible in the field, reacted in most of these tests like one of the most resistant varieties. The whole basis for substituting greenhouse tests for field tests was brought into question by the demonstration that field-grown plants, transplanted to pots and brought into the greenhouse, are much more susceptible than plants of the same age and size started and maintained in the greenhouse.

In a study comparing the performance of first clonal generation progenies at Crookston (Red River Valley) and Castle Danger (Northeastern Minnesota) differences between locations were great for most of the characters studied. Significant location by progeny and location by clone interactions were also obtained. These could be partially attributed to differences in maturity of the parents. The general performance of progenies from early maturing parents was better at Crookston while those from late maturing parents performed better at Castle Danger.

Seed tuber size greatly influenced subsequent field performance. Though the number of clones selected at both locations was similar, the selection of the same clone at the two locations seldom occurred. In most instances, the clone selected at only one location was derived from the larger of the two tubers of each clone that was planted.

In a study concerned with pollen storage, the results indicate that potato pollen collected directly from growing plants can be maintained for at least one year by placing the pollen at -24° C. temperature. Pollen from the variety Redkota was collected directly from growing plants in gelatin capsules using a mechanical vibrator. The capsules were stored in glass vials, with and without CaCl₂ dessican

at temperatures of 24°C., 2.5°C., and -24°C. Test pollinations, including a fresh pollen check, were made at intervals for a year on a number of female parents. The pollen remained viable, as indicated by successful crosses, for eight days when stored at 24°C., for thirty-one days at 2.5°C., and for at least one year when stored at -24°C. Storage with CaCl₂ desiccant did not seem to affect viability.

Potato variety demonstration plots were conducted at six locations in Minnesota in 1960. These trials are in cooperation with commercial growers, county agricultural agents, branch experiment stations and the Minnesota Department of Agriculture. The purpose of these plots is to familiarize the grower with new potato varieties and to assist him in evaluating the varieties for use in his area.

One hundred pounds of seed of each variety is planted in a double row with a commercial planter. Each plot is laid out in a randomized block design and replicated twice in the growers commercial potato field. At harvest the potatoes from a rod row within the double row of each variety are weighed and graded for size. Samples are taken for specific gravity and chipping tests.

The following tables summarize the performance of potato varieties tested in 1960. Minnesota table 2 presents the total yield, percent U. S. No. 1 size and specific gravity of varieties in the Red River Valley. Minnesota table 3 gives the performance of varieties on the peat soil at Hollandale, Minnesota. Minnesota table 4 gives the performance of varieties on the light sandy soils at Osseo, Minnesota.

The length of growing season in the Red River Valley ranged from 104 to 118 days. The specific gravity was reflected in the length of growing season. The average specific gravity of all varieties was 1.078 and 1.086 at locations harvested 104 and 118 days, respectively.

The following numbered selections were included in these trials:

ND 3324-2 - An early maturing, smooth skinned, shallow-eyed white selection. It is 2-3 weeks earlier in maturing than Kennebec and it does not tend to green as much when exposed to natural or artificial light.

F-29 - A new attractive white selection with medium maturity. Tubers are smooth oval with shallow eyes. The skin is often stippled with russet or buff colored.

Picha-5 - A red scab resistant selection with medium early, uniformly round tubers.

Picha-7 - Another red selection resistant to scab and late blight. Tubers are oblong, smooth and shallow eyed. Picha-13 - A scab resistant selection with high red color and glossy skin. Tubers are oblong and flat with shallow eyes.

Minnesota table 2.--Performance of Potato Varieties in Red River Valley Plots - 1960.

Variety	Barnesville (1)				Grand Forks (2)				Stephen (3)				McIntosh (4)				Average	
	Total	U.S.#1	Spec.		Total	U.S.#1	Spec.		Total	U.S.#1	Spec.		Total	U.S.#1	Spec.		Total	U.S.#1
	Yield	Size	Grav.		Yield	Size	Grav.		Yield	Size	Grav.		Yield	Size	Grav.		Yield	Size
	Cwt.	Pct.			Cwt.	Pct.			Cwt.	Pct.			Cwt.	Pct.			Cwt.	Pct.
Kennebec	176	97	1.081		132	95	1.076		280	97	1.090		258	96	1.082		212	96
Cobbler	160	98	1.080		190	97	1.090		236	96	1.092		245	94	1.082		208	96
Bounty	--	--	----		203	96	1.080		--	--	--		--	--	----		203	96
Norland	136	97	1.066		217	97	1.076		266	96	1.074		171	96	1.070		198	96
Red Pontiac	168	98	1.067		200	96	1.071		214	96	1.093		193	94	1.069		194	96
Antigo	140	98	1.078		173	98	1.081		206	95	1.086		162	95	1.071		170	96
Russet Burbank	--	--	----		----	--	----		----	--	----		164	96	1.089		164	96
Cherokee	113	96	1.078		146	95	1.087		188	94	1.091		206	96	1.083		163	95
ND 3324-2	143	94	1.075		109	90	1.078		234	92	1.083		--	--	----		162	92
Red LaSoda	134	98	1.072		159	94	1.067		134	97	1.082		216	97	1.074		161	96
Tawa	93	93	1.078		139	94	1.081		197	89	1.088		142	95	1.077		143	93
Plymouth	73	97	1.074		155	95	1.085		150	97	1.087		135	98	1.074		128	97
Boone	120	97	1.068		98	82	1.063		132	90	1.076		60	90	1.062		102	90
Average	132	97	1.074		160	94	1.078		203	94	1.086		177	96	1.076			

Cooperators:

1. Gary Smith and Carl Smith - Planted June 3, Harvested September 21 (110 days).
2. Red River Valley Potato Growers Association - Planted May 28, Harvested September 8 (104 days).
3. Ralph Hvidsten - Planted May 28, Harvested September 22 (118 days).
4. Stanley Svalen and Levi Hagen - Planted June 2, Harvested September 23 (113 days).

Minnesota table 3. Performance of Potato Varieties at Hollandale, Minnesota, 1960.

Variety	Total Yield Cwt.	U. S. #1 Size Pct.	Specific Gravity
F-29	459	93	1.059
Tawa	432	88	1.063
Norland	334	84	1.055
P-5	334	76	1.061
Cobbler	328	83	1.066
Antigo	326	95	1.062
Red Pontiac	314	86	1.047
Plymouth	306	95	1.062
Red LaSoda	271	93	1.054
Boone	269	90	1.055
P-13	257	82	1.053
Kennebec	255	90	1.057
Cherokee	247	92	1.064
P-7	242	75	1.056
Average	312	87.2	1.058

Cooperator: Southern Minnesota Vegetable Growers - Planted May 26,
Harvested October 11

Minnesota table 4. Performance of Potato Varieties at Osseo, Minnesota, 1960.

Variety	Total Yield Cwt.	U. S. #1 Size Pct.	Specific Gravity
Red LaSoda	407	98	1.065
Red Pontiac	405	97	1.062
F-29	398	95	1.071
Cobbler	389	93	1.074
Kennebec	378	91	1.070
P-15	359	86	1.070
Plymouth	338	99	1.073
Waseca	332	97	1.064
Norland	290	92	1.071
Early Gem	276	98	1.065
P-5	266	83	1.072
P-40	259	85	1.069
Cherokee	238	92	1.074
Tawa	175	96	1.068
Antigo	140	95	1.065
Average	328	93	1.069

Cooperator: Neil and Howard Gray - Planted May 11,
Harvested September 14

MISSISSIPPI
W. S. Anderson

Tennessee grown seed were received August 25, 1959 from Dr. T. P. Dykstra of the following: Catoosa, TL6875, TL6937, TL6894 and TL6543.

These were stored at approximately 45 to 50 degrees F. until planting time. In spring of 1960 there was obtained from the Nebraska Experiment Station seed of the varieties Bounty, Dazoc and Red LaSoda, and as a check variety, Minnesota grown certified seed of Triumph were obtained from a local dealer.

Plots of a soil classified as Kaufman fine sandy loam were prepared on March 28 when approximately 2000 pounds per acre of 6-8-8 fertilizer was applied mechanically, side placing it on both sides of each ridge. Because of extensive rains and a week's delay in receiving seed from Nebraska, planting was not done until April 5, when seedpieces were spaced 12 inches apart in 25-foot rows, a single row being one plot. Six randomized blocks were planted of each variety. The plant stand was practically perfect.

Growing conditions were unfavorable, because of extensive dry and warm weather. One irrigation was applied during April, but conditions beyond control prevented later applications of water and the plants suffered severely. In early June observation revealed that an attack of black leg disease was becoming serious on most plots. A plant to plot check was made on June 4 and apparently there was no difference between the various lots in the amount of disease.

At harvest on June 24, considerable rotting of tubers was in evidence on all plots. The yields were divided into No. 1 size and "others" and weighed. Samples were checked the next day for specific gravity. The data in table 1 below presents these results. Because of the extremely unfavorable season and the low yields, the data were not subjected to statistical analysis. The new named varieties and certainly the selections should be retested. It is best to test these with western grown seed.

Mississippi table 1. Irish potato variety and seedling yield test. State College, Mississippi, 1960.

Variety	Average yield per acre		Specific Gravity	Solids Pct.	Maturity
	U.S. No.1	Others			
	Bu.	Bu.			
Triumph	48	71	1.056	14.5	Early
Catoosa	7	18	1.055	14.3	Medium early
TL 6937	7	29	1.064	16.2	Medium early
TL 6543	13	37	1.064	16.2	Late
TL 6875	23	28	1.063	16.0	Early
TL 6894	17	46	1.058	15.0	Early
Bounty	12	45	1.056	14.5	Late
Dazoc	25	56	1.062	15.8	Very early
Red LaSoda	14	27	1.056	14.5	Very late

MONTANA
Leonard A. Yager

A new potato breeding project was approved for Montana in 1960. Emphasis will be given toward development of varieties superior to the currently grown Netted Gem (Burbank Russet), Bliss Triumph and Pontiac varieties. These are the three most important varieties in the State at the present time.

Considerable attention will be directed toward the development of a white, net skin variety that will be somewhat earlier in maturity than the Netted Gem. Ability to produce under adverse conditions more readily than Netted Gem will be sought. Serious faults of this variety are: tendency to hollow heart, and tendency to second growth, under adverse conditions. Greater resistance to disease, particularly leaf roll, is another characteristic especially desired.

Bliss Triumph and Pontiac have been widely grown, particularly in eastern Montana. Norland appears very promising and may replace these varieties. It produces good sized tubers; tubers are very smooth, with shallow eyes and grade runs high. It is somewhat less susceptible to scab than the two older varieties. Objective in the breeding program for improved reds will be to develop a variety with greater resistance to scab, and with good heat and drouth tolerance.

Variety tests have been conducted over a period of years at the main station and branch experiment stations. Some preliminary greenhouse crossing was started in 1959 and this program is now well underway. Some selections have been made of the 1959 crosses and some have been observed in the field for two growing seasons.

Montana table 1 presents the total yield in pounds per hill of the various varieties and selections that were on hand; they represent yields from 16-hill plots. These were tuber-unit planted, so the yields may not represent yields as they might occur under field conditions. This group will be carefully evaluated and a number selected for further yield trials and for crossing. Evaluation for scab resistance will be given special emphasis.

Montana table 1. Yield, scab and growth cracking incidence, for potato varieties (16-hill plots, unreplicated) and selections, Bozeman, Montana, 1960.

Selection or variety	Total yield per hill	U.S.No. 1	Total solids	Scab ^{1/} Area	Type ^{2/}	Growth ^{3/} Cracking
	Pound	Pct.	Pct.			
Blanca	2.5	66	21.4	0	0	0
Bliss Triumph	4.6	81	19.9	T-1	3	L
Blue Victor	2.5	66	20.7	1-2	4	L
Bounty	3.8	68	19.0	T-1	3	L
Canso	2.4	80	21.4	1-2	3	0
Carnea	2.0	49	21.6	0-2	1	0
Catoosa	3.3	67	20.3	T-3	3	M
Cayuga	2.1	33	20.1	T-1	1	0
Cherokee	4.5	51	19.9	0-1	2	L
Dazoc	3.6	73	17.7	0-2	2	L
Delus	3.1	86	22.2	1-3	3	L
Early Gem	4.4	62	20.1	0	0	H
Excel	2.9	71	20.7	0-2	2	0

continued

Montana table 1, continued.

Fruhperle	3.0	72	21.2	T-2	3	0
Haig	3.5	75	21.6	0-1	1	0
Hindenberg	2.2	33	19.2	0-1	1	0
Jacobi	3.6	34	19.4	0	0	L
Jubel	2.9	35	21.2	0	0	H
Knik	3.1	60	18.8	0-2	1	H
Manota	3.6	74	20.5	1-2	3	L
Maritta	3.7	73	20.9	2-3	4	0
Merrimack	3.2	71	20.3	0-2	2	0
Navajo	3.3	72	19.7	0-1	3	L
Netted Gem	3.3	56	20.9	0	0	0
Nordak	2.8	84	21.2	T-3	3	L
Norgleam	2.6	77	20.3	0-2	2	0
Norland	3.9	87	19.4	0-1	1	0
Osage	2.5	44	21.4	0-1	1	0
Osseo	3.3	70	18.8	1-3	3	L
Ostbote	2.8	88	20.1	T-4	3	0
Redbake	3.0	68	22.9	0-2	3	0
Redburt	7.2	72	19.7	0-2	3	0
Redglo	3.9	55	18.4	T-2	4	H
Redkote	2.8	79	15.8	0-2	1	0
Redskin	4.3	61	18.2	1-3	2	0
Saco	4.7	49	21.4	T-2	3	L
Saskia	3.1	53	21.6	0-3	3	L
Sheridan	2.5	59	21.6	T-1	4	0
Tawa	1.8	52	19.4	1-2	3	M
Thijn	2.5	37	22.0	0	0	0
A 175-7	3.3	66	18.4	0	0	L
A 180-2	3.3	55	18.4	0	0	0
A 180-24	3.3	55	20.1	0	0	0
A 180-26	3.0	48	17.3	0	0	0
A 180-27	3.1	51	16.7	0	0	L
A 223-24	2.4	63	15.4	0-T	1	L
A 223-28	1.7	28	17.7	0	0	L
A 321-1	3.2	62	17.1	0-1	1	0
A 372-11	3.4	41	19.0	0	0	H
A 376-11	2.8	55	19.4	0	0	L
A 376-19	2.5	33	19.2	0	0	H
A 381-11	2.0	47	18.0	0	0	0
A 386-4	2.6	45	21.2	0	0	0
A 406-8	3.1	44	20.9	0-1	2	0
A 407-11	3.1	67	21.4	0-1	1	L
A 465-6	2.9	66	21.2	0	0	L
A 465-10	2.8	58	22.7	0-1	1	0
A 476-1	3.5	51	22.9	0-1	1	0
A 479-2	3.0	63	23.1	0	0	0
A 483-6	3.8	71	20.9	0	0	M
A 483-13	2.2	56	20.7	0	0	0

continued

Montana table 1, continued.

A 495-6	2.0	41	20.7	0-2	2	0
A 508-17	2.3	54	16.2	0-T	1	0
A 508-21	2.5	61	18.0	0	0	0
B 1639	2.7	59	19.0	0-T	1	0
B 2890	1.9	67	18.8	0-T	1	0
B 3254	3.6	64	19.7	0-1	1	0
B 3419	2.8	55	20.5	0-3	3	M
B 991-14	2.5	82	20.1	0-1	1	0
B 73-3	3.3	67	20.3	0-2	3	0
B 355-35	4.2	68	19.7	T-3	3	L
B 595-76	2.6	71	20.3	0-1	2	0
B 605-10	3.2	86	21.6	0-1	1	0
B 926-9	3.7	75	20.1	T-2	2	0
B 962-32	1.3	66	23.3	0	0	0
B 1520-3	3.6	43	18.6	0-1	3	M
B 2834-3	1.1	81	19.9	0	0	0
B 3139-24	2.4	76	20.1	0	0	0
B 3309-8	4.3	64	20.3	T-3	2	2
B 3391-2	2.9	61	20.3	1-3	4	0
B 3427-7	2.8	56	19.7	1	2	0
B 3428-31	2.0	57	22.0	0-T	1	0
B 3454-5	1.9	75	20.7	T-1	1	0
B 3556-12	2.4	48	22.7	0-1	1	0
B 3696-13	3.0	67	18.8	0-T	1	H
B 3725-1	3.2	75	20.7	0-1	1	0
B 4093-18	2.6	60	17.7	0	0	0
B 4094-21	1.5	82	20.1	0-1	4	M
B 4144-5	0.9	59	20.5	0	0	0
B 4145-3	2.1	77	20.9	0-1	1	0
CS 11889	1.5	82	21.4	0-T	1	0
La 1859	4.4	56	9.2	T-2	2	L
Neb 45.51.3	4.7	54	17.3	0	0	M
Neb 114.49-14	2.8	46	22.9	0-1	1	L
Neb 143-50.2	1.9	73	21.2	0-2	2	0
P 45.21.1	2.5	49	22.4	0-1	1	0
P 50.3.52.6	2.6	70	18.8	T-3	3	L
P 50.3.52.9	2.1	69	18.2	0	0	L
P 50.4.52.40	3.4	73	19.7	T-1	1	0
P 51.1.53.13	2.3	77	19.7	0-2	2	0
P 51.1.53.14	3.0	65	18.4	T-2	2	L
P 51.1.53.15	2.2	79	17.5	0	0	0
P 51.1.53.17	2.3	20	20.9	1-2	1	0
P 45.51.3	2.6	47	16.9	0-T	1	0
TL 6894	2.6	57	21.2	0-2	3	L
TL 6937	2.5	56	20.3	T-2	3	L

1/ Surface area covered: 0=none; T, less than 1 percent; 1, 1-20 percent; 2, 21 to 40 percent; 3, 41 to 60 percent, and 4, 61 to 80 percent.

2/ Type of pustule: 1, small, superficial; 2, large but still superficial; 3, large, rough pustules; and 4, large rough pustules, deeply pitted.

3/ Growth cracking: O, none; L, light; M, moderate; H, severe.

NEBRASKA

R. B. O'Keefe, David Nuland and R. T. Miyoshi

I. Development of New Varieties with Superior Disease Resistance, Yield and Quality.

A. Hybridization and Seedling Production: The main objectives of the 1960 crosses were (1) to intensify scab resistance in red tuber clones, (2) to combine scab resistance with high yielding ability in clones of high internal tuber quality and (3) to incorporate genes for heat resistance, field resistance to late blight and virus X resistance into clones of commercial acceptability.

One-hundred and thirty-six families were obtained from crosses between S_1 and S_2 parents and top-crosses with S_0 parents which had shown a relatively high degree of combining ability for the factors of concern. A total of 4800 segregates were grown in the seedling plot (Scotts Bluff Experiment Station) from which 210 selections were obtained for testing for combined characters.

B. Field Screening: A total of 568 clones were screened in 10-hill plots under dryland conditions at the Box Butte Experiment Station. Drouth, combined with a severe hail storm, resulted in severe plant damage and secondary tuber growths. Approximately 56 clones exhibited an ability to withstand these adverse conditions and produce high yields of excellent type and quality of tubers in comparison to standard check varieties.

A total of 286 clones from 1955 to 1958 crosses were screened for scab resistance in replicated blocks (3 reps. of 4 hills) under irrigation in Mitchell Valley (Haig, Nebraska). In addition to scab reaction, yield (lbs/plant) determinations were also made. The data is being analyzed to determine a selection index for selecting for yield and scab resistance simultaneously on a clonal basis. An additional 225 clones were grown for observation in a single replicate.

C. Increase of Advanced Lines: Eighty-three advanced selections of acceptable to excellent commercial quality were increased under dryland conditions for large scale testing. The high yielding selections and their characteristics are presented in Nebraska table 1. These clones are being screened for late blight and virus X reactions. Drouth and severe hail damage reduced yields and tuber grade quality of most clones.

Nebraska table 1. Superior selections in the major increase program, 1960.

Selection	Parents	Yield per acre	Comments
		cwt.	
164.51-2	194.49-2x x 86.48-1	60	Med.red, Ex type, Sc. R.
193.55-1	215.50-2 x 131.50-2	70	Dired, Ex. type, Size
398.55-2	93.48-1 x ND-2906-1R	70	Dired, Ex. Type, Size
412.55-7	Redbake x 107.52-13	70	Dired, Type, Ex. chips
315-48-3x	225.43-1 x Minn 113.43-1	60	Early Red, Long, Processor

continued

Nebraska table 1, continued.

156.51-2	86.48-1 Self.	60	W, Ex. Type, Ex. Chips
27.55-2	ND-2774-3R x 25.47-7x	75	Med. red, Type, Size
201.55-3	222.51-5 x 131.50-2	60	Dired, Ex. Type, SC. R.
396.55-3	Redbake x ND-2906-1R	70	Med. red, Sc.R., Chips
396.55-21	Redbake x ND-2906-1R	60	Med. red, Type, Size

Checks:

Bounty	SND-136 x 217.43-1	75
Red Pontiac		70

II. Development of Varieties Suitable for Chipping and Processing.

A. Screening of clones in the breeding program: A total of 271 clones were screened for chipping quality by established deep-fat frying techniques (350°F., 2.5 min.). Of these 60 clones were repeats of the best clones selected and reported in 1959. The remaining 211 clones were selections from 1956 and 1957 crosses. Determinations were made utilizing 2 samples of 110 gms of fresh tuber slices for each clone. The tubers had been stored at 38°F. for 5 months and reconstituted for 3 weeks at 70°F.

Chip color (Rd) was determined by use of a Spectronic 20 colorimeter with a reflectance attachment. Rd values of 30 to 35 were representative of commercial potato chip samples. Chip yield per 100 pounds of fresh potatoes, dry matter content, and fat absorption were also determined.

The quality of chips produced by the 10 best selections tested in 2 years are given in Nebraska table 2. These clones are being increased for large scale testing. The data for superior selections obtained from clones tested for the first time are presented in Nebraska table 3.

Nebraska table 2.--Chipping quality of the ten superior clones following cold storage and reconstitution (means of 2 years).

Selection	Dry	Chip	Chip yield	Fat	Parents	
	Matter	Color	(lbs/100 lbs)		Female	Male
	Pct.	Rd.	lbs/cwt.	Pct.		
68.55-1	22.6	41.3	33.2	32.2	93.48-1	229.47-1
148.56-1	21.3	36.5	34.5	38.3	Excel	52.53-1
396.55-28	22.6	36.4	34.6	34.6	Redbake	ND2906-1R
78.56-5	20.8	36.3	33.2	37.6	93.48-1	83.51-5
194.56-1	20.6	36.1	32.2	36.0	25.47-7x	Selfed
182.56-1	21.0	35.5	33.6	37.6	140.47-1	USDA 1859
398.55-7	22.0	34.8	33.6	32.0	95.48-1	ND 2906-1R
396.55-20	20.6	33.6	32.7	37.1	Redbake	ND 2906-1R
135.56-3	18.6	33.5	30.4	39.1	93.48-1	395.51-1
318.55-2	18.2	33.5	31.0	41.2	226.49-1x	222.51-9
<u>Checks:</u>						
Haig	18.5	23.7	31.4	41.3	Cayuga	Minn 43

Nebraska table 3. Chip yield and quality of new potato selections following 5 months storage at 38°F. and 3 weeks reconstitution at 70°F., 1960.

Selections ^{5/}	Tuber Color	Dry Matter ^{1/}	Chip Color ^{2/}	Chip Yield ^{3/}	Fat ^{4/}	Parents	
						Female	Male
<u>137.57-5</u>	LR	19.2	34.14	33.6	42.9	84.51-1	90.49-1x
<u>106.57-1</u>	W	22.1	34.05	37.3	40.7	I 801-10	84.51-1
<u>96.56-1x</u>	MR	17.1	33.93	31.8	46.2	222.51-9	114.51-2
<u>96.56-2</u>	LR	18.3	33.78	33.6	45.4	222.51-9	114.51-2
<u>91.56-3</u>	MR	17.1	33.78	30.0	43.1	191.50-1	114.51-2
<u>185.57-1</u>	W	18.9	33.60	37.3	49.3	27.55-1	18.53-2
<u>99.56-1x</u>	LR	17.6	33.54	32.7	47.2	104.52-2	114.51-2
<u>112.57-1</u>	DR	21.3	33.00	35.5	40.1	102.53-8	140.47-1
<u>129.57-2</u>	DR	19.3	33.00	30.9	39.4	Bounty	Bounty
<u>202.57-1</u>	DR	18.0	32.72	32.7	45.1	90.49-1x	240.54-1
<u>87.56-6</u>	LR	17.7	32.10	31.8	44.2	Excel	114.51-2
<u>189.57-1</u>	DR	18.5	31.96	33.6	44.8	Bounty	102.53-8
<u>35.56-3</u>	W	19.5	31.85	32.7	40.5	Haig	29.47-2
<u>128.57-1</u>	LR	19.6	31.80	34.5	43.1	84.51-1	Bounty
<u>145.57-1</u>	LR	22.4	31.76	31.8	41.0	B-595.76	90.49-1x
<u>136.57-2</u>	MR	20.4	31.58	34.5	40.3	77.51-2	90.49-1x
<u>137.57-3</u>	MR	19.7	31.55	34.5	43.0	84.51-1	90.49-1x
<u>96.56-1</u>	LR	17.9	30.98	32.7	45.2	222.51-9	114.51-2
<u>105.57-1</u>	W	18.9	30.50	32.7	42.3	B-595-76	84.51-1
<u>89.56-2x</u>	MR	19.2	30.40	33.6	42.8	86.49-1x	114.51-2
<u>96.56-7</u>	DR	15.7	30.36	30.0	47.6	222.51-9	114.51-2
<u>97.57-1</u>	W	21.2	30.18	33.6	37.0	Haig	84.51-1
<u>78.57-1</u>	W	22.3	30.00	38.2	41.7	84.51-1	378.48-2x
<u>162.57-1</u>	LR	19.6	29.91	38.2	48.7	84.51-1	215.50-2
<u>140.57-4</u>	MR	20.4	29.66	35.5	42.6	392.51-3	90.49-1x
<u>65.57-2</u>	DR	23.5	29.60	41.8	43.7	ND-2853-3R	164.51-2
<u>90.56-4</u>	MR	17.5	29.60	33.6	47.8	131.50-2	114.51-2
<u>88.56-5</u>	MR	14.2	29.51	25.5	44.3	83.49-1	114.51-2
<u>114.57-1</u>	MR	16.9	28.83	32.9	48.2	83.55-3	140.47-1
<u>84.56-9</u>	MR	17.5	28.39	29.1	40.0	93.48-1	114.51-2
<u>88.56-1</u>	LR	16.2	28.28	30.0	46.0	83.49-1	114.51-2
<u>84.56-3</u>	MR	18.2	28.22	31.8	42.7	93.49-1	114.51-2
<u>115.57-3</u>	MR	18.8	27.99	34.5	45.4	Minn 50.49-7	140.47-1
<u>ND-2853-3R</u>		16.1	27.80	30.9	48.0	Cayuga	1021-1
<u>135.57-1</u>	LR	21.4	27.76	35.5	39.7	Haig	90.49-1x
<u>98.57-1</u>	W	17.5	27.45	34.5	49.2	378.48-2x	84.51-1
<u>89.55-1</u>	MR	21.2	27.45	31.8	33.3	93.48-1	95.48-1
<u>117.57-2</u>	DR	18.3	27.36	34.5	47.0	----	----
<u>97.56-1</u>	W	18.0	27.15	30.0	40.0	395.51-2	114.51-2
<u>104.57-1</u>	MR	18.0	27.12	30.9	50.5	191.50-2	84.51-1
<u>186.55-3</u>	DR	19.2	26.89	33.6	48.4	72.49-1	131.50-2
<u>146.57-1</u>		17.8	26.89	32.7	49.8	154.49-3	114.49-1x
<u>89.55-3</u>	DR	18.2	26.80	30.0	47.0	93.48-1	95.48-1
<u>78.56-2</u>	DR	23.0	26.73	31.8	49.7	93.48-1	83.51-5
<u>90.56-3</u>	MR	19.3	26.70	35.5	44.0	131.50-2	114.51-2
<u>129.57-1</u>	MR	16.8	26.67	29.1	49.8	Bounty	Bounty

continued

Nebraska table 3, continued.

142.57-2	LR	11.5	26.66	30.0	48.2	Minn 55.50-26	90.49-1x
49.57-2	MR	14.5	26.60	28.2	40.0	B-3131-N2	156.52-2
90.56-1	MR	15.7	26.56	29.1	40.1	131.50-2	114.51-2
30.57-2	LR	19.4	26.54	39.1	41.8	45.51-3	143.49-1
99.56-1	MR	15.9	26.50	30.9	42.9	104.52-2	114.51-2
110.57-2	DR	15.1	26.46	30.0	45.5	131.50-2	140.47-1
96.57-1	MR	20.3	26.34	38.2	39.3	114.49-1x	77.51-2
I-1361-2		13.7	26.16	27.3	27.8	----	---
97.57-2	W	18.3	26.12	32.7	45.7	Haig	84.51-1
250.57-1	LR	17.3	26.10	34.5	42.3	156.52-2	Wisc 137.52
89.56-1	MR	14.1	26.10	27.3	61.6	86.49-1x	114.51-2

Checks:

Cayuga	16.3	25.72	30.0	45.7	--	--
Haig	17.3	25.42	30.0	48.2	--	--
L.S.D. .05		1.6				

- 1/Calculated on basis of % D.M. in chips applied to 100 pounds of raw potatoes.
- 2/Rd value on basis of pure white standard.
- 3/Pounds per 100 pounds of raw potatoes.
- 4/Fat adsorption determined by extracting fat from 10 gm chips in 75 ml. Toluene.
- 5/Underlined selections were most uniform in color, texture and dryness of chips.

B. Tests with commercial varieties and advanced selections grown at several locations in 1959: Chipping tests were conducted with tubers of 12 varieties and advanced selections grown with irrigation as an early crop in Central Nebraska (April 6 to July 23) and as a late crop in Western Nebraska (June 12 to October 8) in 1959. Test conditions and determinations were identical to those previously described (II. A). Each variety was chipped before chilling (check) and after chilling at 38°F. for 3 weeks followed by reconstitution at 70°F. for 2 weeks.

The data are presented in Nebraska table 4 and 5. Haig was the outstanding variety in the Central Nebraska trial followed by Bounty, Nebraska 181.51-2, 156.51-2 and 302.50-5 (table 4). In Western Nebraska, Nebraska 156.51-2 was the outstanding variety followed by 302.50-5, 181.51-2, Haig, and Norland (table 5). Nebraska 156.51-2 and 302.50-5 are being increased for potential use as processing varieties.

The effects of location and variety-location interaction on chipping quality were pronounced. The potatoes from the Mirage Flats plot were chilled in the field prior to harvest and their specific gravities were lower than for potatoes derived from the Dutch Flats plot (Nebraska table 5). Consequently, better chips were produced from the Dutch Flats original (check) potatoes than from Mirage Flat potatoes. However, chips produced from chilled and reconstituted tubers were comparable for the 2 locations though the variety-location interaction effect was significant.

Approximately 2000 acres of Haig were grown in Nebraska in 1960. Samples were taken from 32 lots in storage in November. The specific gravity of the lots ranged from 1.075 to 1.098 with an average of 1.089. Reducing sugar content varied with method of storage and ranged from 0 to 0.25 percent. Several car-load lots were supplied to chippers.

III. Breeding potato parental lines for resistance to scab, heat and drouth; contributing to Regional Project NC-35, Potato Improvement through parental line breeding.

A. Scab resistant parental line development: Work was continued at the Nebraska station with regard to the components of phenotypic variance for the inheritance of scab resistance and the development of parental lines with increased combining ability for the character.

Nebraska table 4. Chip yield and quality of potatoes produced with irrigation in Central Nebraska, Gibbon, 1959.

Variety	Dry Matter ^{1/}		Chip Color ^{2/}		Chip Yield ^{3/}		Percent Oil	
	Ck.	Rec.	Ck.	Rec.	Ck.	Rec.	Ck.	Rec.
	Pct.	Pct.						
1 Dazoc	18.1	18.6	31.3	26.9	30.9	30.0	41.6	38.0
3 Bounty	17.9	20.1	42.9	36.9	30.0	32.7	40.4	38.4
5 Red Pontiac	18.3	21.2	31.9	32.1	30.9	32.7	40.9	35.3
7 Norland	16.1	18.5	30.1	28.5	28.2	30.9	42.9	40.2
15 Haig	17.5	19.5	40.1	37.8	30.0	32.7	41.8	40.4
9 124.48-1x	16.7	18.6	42.3	25.0	28.2	33.6	40.8	44.6
10 38.49-6	18.7	19.4	34.0	24.1	30.0	33.6	37.8	42.2
11 90.49-1x	17.0	19.9	31.1	30.5	30.0	33.6	43.3	40.9
14 181.51-2	18.8	22.8	40.7	40.0	30.9	36.4	39.1	37.5
16 302.50-5	19.9	21.2	39.0	27.8	31.8	35.5	37.6	40.3
17 45.51-3	15.3	19.7	33.0	19.6	26.4	32.7	41.9	39.9
18 156.51-2	20.6	20.4	31.1	34.5	33.6	35.5	38.8	42.6

^{1/} Calculated by applying % D.M. in chips to 100 pounds of raw potatoes.

^{2/} Rd value on basis of 100% pure white standard.

^{3/} Pounds per 100 pounds of raw potatoes.

Nebraska table 5. Chip yield and quality of potatoes produced with irrigation in Western Nebraska, 1959.

Variety	Location	Dry Matter ^{1/}		Chip Color ^{2/}		Chip Yield ^{3/}		Percent Oil	
		CK	Rec	CK	Rec	CK	Rec	CK	Res
1 Dazoc	Mirage Flats	17.0	16.2	24.4	36.7	28.6	29.1	40.7	49.4
	Dutch Flats	21.6	16.4	25.6	21.0	30.0	30.9	28.1	51.8
	\bar{x}	19.3	16.3	25.0	28.8	29.3	30.0	34.4	50.6
3 Bounty	Mirage Flats	18.4	17.9	21.0	45.6	29.0	29.1	36.7	44.0
	Dutch Flats	22.2	19.3	24.8	27.3	31.8	32.7	38.0	46.5
	\bar{x}	20.3	18.6	22.9	36.4	30.4	30.9	37.3	45.2
5 Red Pontiac	Mirage Flats	17.5	14.5	12.9	39.5	28.6	28.2	39.0	53.2
	Dutch Flats	19.1	16.9	26.7	25.5	30.0	28.2	36.4	45.4
	\bar{x}	18.3	15.7	19.8	32.5	29.3	28.2	37.7	49.3

continued

Nebraska table 5, continued.

7	Norland	Mirage Flats	17.0	15.6	19.8	29.8	30.0	28.2	43.2	49.8
		Dutch Flats	17.6	16.7	47.9	25.9	29.1	30.0	39.4	49.4
		\bar{x}	17.3	16.2	33.8	27.8	29.6	29.1	41.3	49.6
15	Haig	Mirage Flats	18.9	18.2	25.6	46.3	30.0	30.9	37.0	46.5
		Dutch Flats	18.7	17.2	25.9	21.9	29.6	32.7	36.8	52.2
		\bar{x}	18.8	17.7	25.8	34.1	29.8	31.8	36.9	49.4
9	124.48-1x	Mirage Flats	15.7	15.2	18.3	32.9	29.5	27.3	46.8	49.4
		Dutch Flats	15.3	17.6	23.3	20.5	27.3	30.0	44.9	46.8
		\bar{x}	15.5	16.4	20.8	26.7	28.4	29.8	45.8	48.1
10	38.49-6	Mirage Flats	17.4	14.7	24.8	28.1	25.9	27.3	32.8	51.0
		Dutch Flat	18.9	17.9	27.5	22.7	28.2	30.0	33.0	45.9
		\bar{x}	18.2	16.3	26.2	25.4	27.0	28.6	32.9	48.4
11	90.49-1x	Mirage Flats	18.5	16.5	23.3	41.5	29.0	30.0	36.4	50.0
		Dutch Flats	21.1	18.1	31.1	30.6	31.4	32.7	32.9	49.8
		\bar{x}	19.8	17.3	27.2	36.0	30.2	31.4	34.6	49.9
14	181.51-2	Mirage Flats	19.2	16.4	24.5	49.9	30.0	29.1	36.1	48.9
		Dutch Flats	21.2	16.1	33.0	21.9	30.9	33.6	31.4	56.4
		\bar{x}	20.2	16.2	28.8	35.9	30.4	31.4	33.7	52.6
16	302.50-5	Mirage Flats	18.4	16.6	22.3	49.5	29.0	30.0	36.9	49.8
		Dutch Flats	18.4	18.3	37.3	33.9	29.6	32.7	37.9	49.1
		\bar{x}	18.4	17.4	29.8	41.7	29.3	31.4	37.4	49.4
17	45.51-3	Mirage Flats	14.6	13.7	17.3	46.4	25.0	24.6	41.8	49.4
		Dutch Flats	20.4	14.3	32.3	22.7	30.9	30.0	34.1	56.8
		\bar{x}	17.5	14.0	24.8	34.6	27.9	27.3	37.9	53.1
18	156.51-2	Mirage Flats	20.1	19.5	35.9	45.8	32.3	33.6	37.7	47.2
		Dutch Flats	26.1	20.1	43.6	48.6	33.6	34.5	22.2	47.1
		\bar{x}	23.1	19.8	39.7	47.2	32.9	34.0	29.9	47.1
L.S.D. .05			3.1	11.6	1.1	10.3				

1/ Calculated on basis of % D.M. in chips applied to 100 pounds of raw potatoes.

2/ Rd value on basis of 100% white standard.

3/ Pounds per 100 pounds of raw potatoes.

Heritability estimates obtained by parent-offspring regressions were 0.70, 0.35 and 0.57 for 1959, 1960 and the 2-year data respectively, which substantiated the previous hypothesis that additive as well as dominant gene effects should be considered in developing parental lines (Nebraska table 6). The heritability estimates of 0.51 and 0.58 obtained by the components of phenotypic variance method were in agreement with those obtained by parent-offspring regression. Year and replication effects accounted for 33 and 24 percent of phenotypic variation respectively.

A reciprocal recurrent selection program has been inaugurated to obtain estimates of both dominance and additive gene effects and to test parental inbred lines for both specific and general combining ability. The feasibility of testing parental lines for scab resistance and yielding ability simultaneously is being investigated.

B. Heat resistant parental line development: A balanced experimental design was employed to test the C₁ generation of inbred and cross progenies of resistant and susceptible parents by the heat machine method, i. e., 120° F., 50-60% R.H., 4 hours (Nebraska table 7). Heritability estimates obtained by the components of variance method were 0.19 and 0.17 for families (average genotypes) and selections in families respectively in comparison to heritability estimates of 0.24 to 0.34 (parent-offspring regression) for the same progenies grown from true seed in 1959. The mean resistance of progenies was lower in the C₁ generation than in the seedling generation and was intermediate of the two parental inbred progeny means (Nebraska table 8). The data suggested a dominance effect for susceptibility. The possibility of the presence of a cytoplasmic effect in the inheritance which was suggested in the seedling generation was not evident in the C₁ generation.

Populations have been developed for testing parental lines for cytoplasmic effects and for combining ability for heat and heat induced drouth resistance in successive generations of inbreeding. The experimental design being employed will provide estimates of both dominance and additive gene effects.

Heat resistance has been found to be correlated with the heritable characters of plant height and leaf size (area). Consequently, the feasibility of utilizing multiple-regression and a selection index in the development of heat resistant parental lines is being investigated.

Nebraska table 6. Parent-offspring regressions and analysis of variance for half-sib progeny means in two years of testing for scab resistance.

Selection	Male Parent + Resistance			Progeny Mean Resistance		
	1959	1960	Mean	1959	1960	2 Year
156.52-2	1	1	1.0	2.49	3.80	3.15 ^s
114.51-2	2	1	1.5	2.40	3.35	2.88
77.51-2	2	2	2.0	2.28	2.71	2.50
45.51-3	1	3	2.0	1.33	3.67	2.50
143.49-1	1	3	2.0	1.62	2.50	2.06
84.51-1	3	1	2.0	2.00	4.22	3.11
Haig	2	2	2.0	2.33	3.33	2.83
164.51-2	2	3	2.5	1.76	2.33	2.05
154.49-3	2	4	3.0	2.25	3.50	2.88
240.54-1	3	3	3.0	3.20	2.20	2.70
29.47-2	3	3	3.0	2.83	3.75	3.29
114.49-1x	3	4	3.5	2.80	4.60	3.70
93.48-1	4	4	4.0	3.00	4.17	3.58

continued

Nebraska table 6, continued.

90.49-1x	4	5	4.5	3.09	4.45	3.77
Bounty	4	5	4.5	2.77	3.78	3.28
215.50-2	5	5	5.0	3.78	4.44	4.11
131.50-2	5	5	5.0	2.71	3.71	3.21
140.47-1	5	5	5.0	3.08	3.83	3.46
Mean	2.89	3.28	3.08	2.54	3.57	3.06

Heritability:		.70	.35	.57
Parent-offspring Regression		.58	.34	.65
F ₂		.783**	.339	.659**

Analysis of Variance

Source	d.f.	Sum Sq.	Mean Sq.
2 years	1	9.6308	9.631**
18 families	17	10.9862	0.646*
Error	17	4.4654	0.262

$$1/4 Sg^2 = (0.646 - 0.262) \div 2 = 0.192$$

$$Sg^2 = 0.192 \times 4 = .768$$

$$Sy^2 = (9.631 - 0.262) \div 18 = 0.520$$

$$Se^2 = 0.262$$

$$Sp^2 = .768 + 0.520 + 0.262 = 1.556$$

$$\text{Heritability} = .768 \div 1.556 = \underline{0.51}$$

$$S^2y/Sp^2 = \underline{0.33}$$

1960 data only: 3 replicates of 243 selections

$$\text{Heritability} = \underline{0.58}; \text{Variance due to rep.} = \underline{0.24}$$

Nebraska table 7. Progeny mean clonal resistance to heat as determined by heat machine tests in 1960.

Group and Means (3 replicates)									
FAMILY		I		II		III		Total	
No.	Parents	No. Sel.	Mean Resist	No. Sel.	Mean Resist	No. Sel.	Mean Resist	No. Select	Mean Resist
1	10.4 Self.	2	3.00	3	2.67	3	2.44	8	2.67
2	133 x 104	6	3.00	6	3.33	6	3.00	18	3.11
3	114 x 104	2	3.33	2	2.00	2	2.67	6	2.67
4	133 Self.	1	4.00	1	4.00	1	3.33	3	3.78
5	133 x 140	4	3.42	4	2.75	4	3.00	12	3.06
6	114 x 140	11	2.79	11	3.06	12	2.97	34	2.94
7	114 Self	7	3.05	6	1.83	5	3.20	18	2.68
8	104 x 140	16	3.02	16	2.97	16	3.50	48	3.17
Total		49	-	49	-	49	-	147	-
Mean			3.20		2.83		3.01		3.00

continued

Nebraska table 7, continued.

Analysis of Variance			
Source	d.f.	Sum Sq.	Mean Sq.
3 Groups	2	6.481	-
3 Reps in groups	6	24.612	-
8 Families	7	20.584	2.941**
F x G	14	34.026	2.430**
F x Runs in groups	42	25.815	.615
49 Clones in families			
in groups	123	140.901	1.146**
clones in families			
x runs in groups	246	165.572	.673

On clonal basis:

$$Sg^2 = (1.146 - .673) \div 3 = 0.158$$

$$Se^2 = .673$$

$$Sp^2 = .831$$

$$\text{Heritability} = .158 \div .831 = \underline{0.19}$$

On family basis:

$$Sf^2 = (2.941 - 2.430) \div 9 = 0.0567$$

$$S^2_{fg} = (2.430 - .615) \div 9 = 0.202$$

$$Se^2 = .615 \div 9 = 0.0683$$

$$Sp^2 = .3270$$

$$\text{Heritability} = 0.0567 \times .3270 = \underline{0.17}$$

Nebraska table 8. Mean heat resistance of progenies in the seedling and first clonal generations as determined by heat machine tests.

Seedling generations as determined by root means square											
Clonal Generation							Seedling Generation				
Male	Parent	Female Parents				Female Parents					
Sel.	Clonal*	Male					Male				
	Resist	104	114	133	140	Mean	104	114	133	140	Mean
104	1	2.67	2.67	3.11		2.82	2.57	3.00	2.70		2.76
114	1		2.68					1.70			
133	1			3.78					1.67		
140	4	3.17	2.94	3.06	3.14	3.08	2.86	1.90	1.63	3.00	2.35
Female Means		2.92	2.76	3.32	-	-	2.72	2.20	2.00	-	-

* 1 = 0 to 25% leaves destroyed

2 = 25 to 50% leaves destroyed + slight stem damage

3 = 50 to 75% leaves destroyed + moderate stem damage

4 = 75 to 100% leaves destroyed + severe stem damage

Heritability estimates:

Seedling generation by Parent-offspring regression

Inbreds = 0.24

Crosses = 0.34

Clonal generation by Components of Variance

Inbred + Crosses = 0.17 on family basis

= 0.19 on individual basis

IV. Potato Variety Trials, 1960.

A. Central and Western Nebraska: Nine named varieties and eleven advanced selections were included in seven trials of 4 replicates of 20 hills each. The data for two dryland and three irrigated trials are presented in this report.

The irrigated trial at Gibbon (Buffalo Co.) was planted in early April and harvested in late July. Hail damage to vines in mid-season reduced yields and tuber quality of most varieties (Nebraska table 9). The highest yielding variety was Bounty. The highest specific gravity was produced by Excel, followed by Blanca. Nebraska 396.55-3 and 27.55-2 produced yields comparable to Red Pontiac.

The irrigated trials in the late crop area of western Nebraska were located at Dutch Flats (Sioux Co.) and Mirage Flats (Sheridan Co.). The plots were planted in mid-June and harvested in early October. The highest yielding varieties were Bounty, Red LaSoda, Red Pontiac and La 42-45 (Nebraska table 10). High specific gravity (1.080 +) was obtained with Nebraska 156.51-2, 186.55-3, Blanca, Navajo, Bounty and Haig. Scab was a major defect for all varieties except Haig, Norland and Blanca in the Dutch Flats trial. The Nebraska selections 201.55-3, 396.55-3 and 396.55-21 were relatively free of scab and acceptable with regard to yield and other characters.

The dryland trials in western Nebraska were located at Alliance (Box Butte Co.) and Gordon (Sheridan Co.). The plots were planted in mid-June and harvested in early October. Drouth conditions prevailed in both areas and severe hail damage occurred in the Alliance plot. Yields of 100 cwt. or more were obtained with Red Pontiac, Bounty, Red LaSoda, Haig, La 42-45 and Nebraska 27.55-2, (Nebraska table 11). The highest specific gravity was obtained with Nebraska 156.51-2 and Blanca. The grade of U. S. No. 1 potatoes ranged from 33 to 71 percent with the major sort-out factor being attributed to small tubers (under 1 7/8 inches).

B. Adaptability of Nebraska Selections to Production in Gulf Coast Areas: Advanced selections and varieties from the Nebraska breeding program were tested in south Texas in cooperation with the Weslaco Experiment Station (D. M. McLean, USDA, ARS). Bounty and 10 selections, which had performed well in earlier tests, were compared with the standard variety Red LaSoda. The plot was planted on January 16 and harvested on May 16, 1960. The plants were frozen back to the ground two weeks after emergence. Yields were considerably lower than in previous years. The highest yields were produced by Bounty, Red LaSoda, Nebraska 302.50-5 and 78.55-2 (Table 12). The percentage of U. S. No. 1 tubers ranged from 10 to 86 percent. The major sort-out factor was small tubers under 1 7/8 inches.

An additional 30 selections were included in an observational planting. Qualitative notes were obtained and seven selections appeared to be worthy of testing in replicated trials in future years.

Nebraska

Table 9. Yield, grade and specific gravity of potatoes produced with irrigation in Central Nebraska (Gibbon) 1960, (Means of 4 replicates).

Variety	Total Yield Cwt.	Percent each grade				Specific Gravity
		US #1	Defects		Under 1 7/8"	
			Scab	Others		
Dazoc	241	80	0	5	15	1.075
Red Pontiac	252	89	1	5	5	1.065
Bounty	292	87	0	3	10	1.075
Haig	150	76	0	6	18	1.068
Red LaSoda	249	84	0	10	6	1.067
Norland	210	83	0	6	11	1.060
Excel	203	74	0	2	24	1.085
38.49-6	226	76	0	14	16	1.078
181.51-2	169	61	0	8	31	1.079
156.51-2	211	40	0	48	12	1.079
Blanca	129	79	0	5	16	1.083
Navajo	89	83	0	4	13	1.077
201.55-3	228	80	0	1	19	1.075
186.55-3	233	81	0	6	13	1.076
396.55-1	206	79	0	6	15	1.067
396.55-3	243	86	0	6	8	1.071
27.55-2	248	82	0	11	7	1.067
396.55-21	206	79	0	4	17	1.061

Nebraska table 10. Yield, grade and specific gravity of potatoes produced with irrigation in Western Nebraska, 1960. (Means of 4 replicates at 2 locations.

Variety	Total Yield Cwt.	Percent each grade				Specific Gravity
		US #1	Defects		Under 1 7/8"	
			Scab	Other		
Dazoc	323	78	6	11	5	1.077
Progress	338	85	1	8	6	1.080
Red Pontiac	362	77	3	19	1	1.073
Bounty	427	83	3	12	2	1.084
Haig	295	85	1	11	3	1.080
Red LaSoda	367	80	3	15	2	1.077
Norland	330	87	1	10	2	1.070
38.49-6	292	82	1	12	5	1.080
90.49-1x	351	71	7	17	5	1.080
181.51-2	301	75	2	18	5	1.078
156.51-2	328	73	3	11	13	1.087
La 42-45	354	73	7	18	2	1.077
Blanca	285	85	1	6	8	1.086
Navajo	220	79	3	13	5	1.084
201.55-3	336	81	1	16	2	1.078
186.55-3	312	73	6	16	5	1.086
396.55-1	332	84	1	13	2	1.079
396.55-3	338	87	1	9	3	1.079
27.55-2	331	79	3	16	2	1.074
396.55-21	287	90	1	5	4	1.076
L.S.D. .05	19					.003

Table 11. Yield, grade and specific gravity of potatoes produced on dryland in Western Nebraska, 1960. (Means of 4 replicates at 2 locations).

Variety	Total Yield Cwt.	Percent each grade				Specific Gravity
		US #1	Defects		Under 1 7/8	
			Scab	Others		
Dazoc	77	62	2	5	31	1.081
Progress	63	38	1	2	59	1.075
Red Pontiac	115	61	1	23	15	1.077
Bounty	108	45	1	32	22	1.084
Haig	100	71	1	6	22	1.088
Red LaSoda	102	62	1	21	16	1.082
Norland	81	57	0	13	30	1.079
Excel	-	-	-	-	-	-
38.49-6	84	60	0	7	33	1.084
90.49-1x	85	43	6	24	27	1.084
181.51-2	81	51	1	12	36	1.086
156.51-2	76	33	0	2	65	1.092
La 42-45	103	55	0	16	29	1.089
Blanca	81	46	0	1	53	1.091
Navajo	68	66	0	2	32	1.088
201.55-3	100	57	0	18	25	1.088
186.55-3	99	71	1	2	26	1.083
396.55-1	96	54	1	14	31	1.083
396.55-3	94	76	1	9	14	1.081
27.55-2	100	65	1	21	13	1.076
396.55-21	86	48	0	25	27	1.086
L.S.D. .05	12					.007

Nebraska table 12. Yield, grade and specific gravity of potatoes produced with irrigation at Weslaco, Texas, 1960. (Means of 4 replicates of 20 hills).

Variety	Total Yield Cwt.	Percent each grade			Specific Gravity
		US #1	Defects	Under 1 7/8"	
Bounty	76	75	0	25	1.072
Red LaSoda	72	86	5	9	1.059
302.50-5	66	60	8	32	1.073
78.55-2	64	80	9	11	1.076
122-56-2	53	61	4	35	1.072
182.55-6	40	60	10	30	1.078
176.50-3	36	60	7	33	1.061
183.55-3	36	16	0	84	-
396.55-7	30	42	6	52	-
38.49-6	28	62	0	38	1.070
90.49-1x	26	65	7	28	1.070
124.48-1x	24	10	0	90	-
L.S.D. .05	4				

NEW HAMPSHIRE
Paul T. Blood

The data presented in New Hampshire tables 1 and 2 are the results of a cooperative test conducted by New Hampshire, Maine, and the National Potato Breeding Program. All plots were planted May 6, killed September 3, and harvested September 30. Approximately 1600 pounds of 10-15-15-2 L. C. fertilizer was applied per acre.

New Hampshire table 1. Yield, Percentage of Yield Between 1-7/8 and 4 inches, Total Solids for the 12 potato varieties grown at Northwood, New Hampshire, 1960.

Variety ^{1/}	Yield per acre above 1½ inches	Yield 1-3/4 to 4 inches	Yield 2½ to 4 inches	Total solids
	Cwt.	Pct.	Pct.	Pct.
Kennebec	454	94	87	20.8
Green Mountain	381	93	81	23.4
Huron	318	93	76	21.4
Mohawk	308	96	91	21.7
Katahdin A ^{2/}	307	97	86	21.3
Plymouth	307	97	89	19.8
B 3802-15	278	89	61	21.1
B 2894-24	254	95	87	19.2
B 3696-13	222	93	77	21.3
B 766-E	217	95	72	18.9
Delus	211	96	88	22.3
B 3604-1	137	79	54	17.7
L.S.D. .05	75	--	--	0.8
L.S.D. .01	101	--	--	1.0

^{1/} Varieties arranged in descending order of yields. Seedpieces of all varieties were spaced 10 inches apart.

^{2/} Katahdin A is 40% virus X.

New Hampshire table 2. Percent of total yield distribution by grade size classes of the 12 potato varieties grown at Northwood, New Hampshire, 1960.

Variety	1½ to 1-3/4 inches	1-3/4 to 2 ½ inches	2½ to 3 ½ inches	3½ to 4 inches	Over 4 inches
Kennebec	1.6	7.2	54.7	32.3	4.2
Green Mountain	4.3	12.2	66.8	14.4	2.3
Huron	7.4	17.0	62.8	12.8	---
Mohawk	1.2	4.7	68.3	23.0	2.8
Katahdin A	3.4	10.3	75.7	10.6	---
Plymouth	1.9	8.3	68.0	20.5	1.3
B 3802-15	11.0	28.4	59.0	1.6	---
B 2894-24	1.3	7.9	63.0	24.4	3.4
B 3696-13	7.3	16.2	70.9	5.6	---
B 766-E	4.9	23.6	70.7	0.8	---
Delus	2.9	7.8	66.3	21.9	1.1
B 3604-1	20.9	25.4	48.9	4.8	---

NEW JERSEY
John C. Campbell

Variety trials were conducted in three locations in 1960 to compare newly released varieties with older ones for yield, total solids, market and processing quality. Several USDA seedlings were also tested to determine their adaptability to New Jersey conditions in an effort to find superior varieties for New Jersey.

Chip color was determined in the Food Science Department and frozen French fry quality was determined at Seabrook Farms on samples grown there.

Simonson Test. Twenty named varieties and 16 seedlings were planted by machine in two-row plots on April 12 at the Simonson farm in Cranbury. Seed was spaced 10 inches apart in 36 inch rows and fertilized with 2400 pounds of a 5-10-10 per acre. Rainfall was adequate for good growth except for two short periods when 1 inch of water was applied by irrigation. Temperatures were slightly below average and very favorable for potato development. The named varieties were replicated 4 times but the seedlings were not. This test was harvested September 8 after all varieties were mature. Yields were obtained from 1/60th acre of each plot. Total and U. S. No. 1, (2 inch minimum) yields in hundredweights and total solids of all varieties are presented in New Jersey table 1.

In addition to the seedlings in this test, 53 other USDA seedlings selected in Maine in 1959 were planted by hand in single row plots. Of this group 26 were considered good enough to be tested again in 1961 and additional quantities were selected in Maine in 1960 for planting in 1961.

Avon and Fundy, grown in New Jersey for the first time and obtained from Dr. Young in Fredericton, Canada, outyielded Irish Cobbler in this test. Avon outyielded Cobbler in two other tests, and Fundy yielded slightly less than Cobbler in other tests. These early-maturing varieties are considered very promising for the early market in New Jersey.

Blanca and Navajo, scab-resistant varieties recently released in Colorado, did not produce good yields but produced tubers with above average total solids. They will be tested again.

Kennebec, Teton, Green Mountain, and Seedling B3352-8 produced exceptionally high yields in the Simonson test. Several varieties produced tubers with above 18 percent total solids. High solid production was attributed to the relatively low average temperatures during the summer.

Seabrook Experiment. Sixteen varieties were hand planted April 21 in 4 single row plots. Seed was spaced 10 inches apart in 36 inch rows each forty feet long. Nine seedlings and two varieties were planted in single plots. A ton of 6-12-12 was broadcast and plowed under before planting and 350 pounds more were placed in bands at planting. The experiment was irrigated twice and rainfall was abundant most of the season. The early maturing varieties were harvested by hand

New Jersey table 1, continued.

B 3352-8	468	431	92	19.4	Good appearance, 6% B's, No off grade
B 3556-11	391	336	86	20.2	8% B's, no off grade
B 3453-2	385	362	94	18.7	6% B's (Red Russet)
B 3819-17	364	335	92	17.9	Large flat tubers, 7% B's
B 2894-24	359	345	96	17.5	Large tubers
B 3725-1	356	306	86	17.5	3% knobby, 11% B's
B 3604-19	319	284	89	15.6	6% B's
La 91-78 (Wis)	311	292	94	17.5	6% B's
La 42-45 Red (Wis)	310	279	90	16.4	8% B's
B 3626-13	306	248	81	16.4	16% B's, round, smooth
B 3454-5 Red	297	270	91	17.3	8% B's, No off grades
B 3696-13	257	234	91	17.9	8% B's, oblong
B 4159-2	247	148	60	17.7	18% growth cracks, 19% B's
B 4094-21	232	155	67	14.3	26% growth cracks, 7% B's, russeted tubers
B 3726-6	204	143	70	19.8	3% growth cracks, 24% B's, skin rough
B 3837-11	193	160	83	16.4	5% very rough skin, 9% B's

1/ Von Scheele conversion table used

2/ 25% leaf roll

New Jersey table 2. French fry and quality evaluation of selections grown on the Seabrook Farms, Seabrook, New Jersey, November 9, 1960.

Rank	Variety	Color	Average Score*	
			Texture	Flavor
1	Avon	1.17	2.00	2.00
3	La. 9178	1.33	4.00	3.00
8	Navajo	2.00	3.33	3.00
13	Cobbler	2.33	3.00	2.33
14	Fundy	2.50	2.75	2.75
16	La 4245	2.50	4.00	3.00
17	Keswick	2.67	3.67	3.00
18	Antigo	2.67	4.00	3.00
19	B. 3837-11	2.83	3.75	3.00
20	B. 3604-19	3.00	-	-
23	B. 3556-11	3.17	3.25	3.00
25	Houma	3.33	-	-
28	Chippewa	3.50	5.00	-
30	Plymouth	3.83	-	-
31	Green Mountain	3.83	-	-
32	Onaway	3.83	-	-
33	B. 3352-8	3.83	-	-
35	Merrimack	3.83	-	-
37	B. 4159-2	4.00	-	-
39	Katahdin	4.17	-	-
45	Kennebec	4.50	-	-
46	Russet Burbank	4.50	-	-
47	Huron	4.50	-	-
48	Teton	4.67	-	-
50	Pungo	4.83	-	-
54	B. 3726-6	4.83	3.67	3.00
55	B. 3454-5	5.00	4.00	4.00

* Figures are average score for the evaluation panel. Score guide was as follows: 1, excellent (outstanding); 2, better than ave.; 3, ave. or normal; 4, poorer than normal; 5, poor (rejected).

on August 18 and 22 and the other varieties on September 27.

The Kennebec, Teton and Chippewa varieties and seedling varieties B 3556-11, B 3352-8 and La 4245 produced exceptionally high yields with three of the varieties producing over 1000 bushels per acre. Total solids of varieties in this test were below average. This may be attributed partially to the relatively high amount of potash applied.

Forzen French fry quality based on color, flavor, and texture of cooked French fries, was determined by a panel of five on November 9. The ratings are listed in table 3. The yields and total solids are reported in New Jersey table 2.

Tindall Test. This test, located near Trenton in Central Jersey, was planted in duplicated two row plots by machine on April 20. Approximately 1800 pounds of a 6-12-12 fertilizer was applied in bands at planting. The soil is a sandy loam with a pH of 5.1. Potatoes were irrigated twice and rainfall was adequate most of the season. The test was harvested October 17.

The Kennebec, Onaway, Chippewa, Pungo and Houma varieties all produced over 400 cwt. per acre while Avon produced only a few sacks less. One source of Huron produced 125 cwt. more U. S. No. 1's per acre than another. Most of this difference is believed to be due to the high percentage of leaf roll in one seed source. Total solids of all varieties was somewhat lower than for the same varieties in the Simonson test. Yields and total solids are shown in New Jersey table 4.

New Jersey table 1. Total and U.S.No. 1 yields and total solids of potato variety test, Simonson Farm, Cranbury, New Jersey, 1960.

Variety	Yield per acre			Total Solids ^{1/}	Remarks
	Total	U.S. No.1	U.S. No.1		
	Cwt.	Cwt.	Pct.	Pct.	
Kennebec	404	372	92	18.7	4% knobby and growth cracks
Teton	401	381	95	17.5	No off grades
Green Mountain	393	369	94	21.7	1% knobby
Russet Burbank	388	303	78	19.4	11% knobby and misshaped
Houma	380	346	91	18.3	.5% scabby
Onaway	369	343	93	16.6	No off grades
Chippewa	349	325	93	16.2	1% misshaped
Keswick	336	319	95	18.1	2% fusarium and soft rot
Avon	332	312	94	18.5	No off grades
Pungo	331	311	94	18.1	1% misshaped
Antigo (Wis)	329	306	93	17.1	2% knobby
Huron (Me.)	329	266	81	18.5	1% misshaped, 14% B's
Fundy	326	310	95	17.7	No off grades
Plymouth	321	299	93	18.5	2% scabby and misshaped
Cobbler	319	281	88	18.1	No off grades
Katahdin	310	288	93	17.1	No off grades
Blanca	302	254	84	19.2	.5% knobby, 14% B's
Huron (N.Y.) ^{2/}	271	217	80	18.3	15% B's
Merrimack	261	243	93	18.5	6% B's
Navajo	240	216	90	18.1	8% B's, 1% growth cracks

L.S.D. at 1% = 80 cwt.*

continued

New Jersey table 3. Potato variety test, Tindall Farm, Trenton, New Jersey, 1960.

Variety	Yield per acre					Remarks
	Total	U.S. No.1	U.S. No.1	B's	Total Solids	
	Cwt.	Cwt.	Pct.	Pct.	Pct.	
Kennebec	532	489	92	2.1	17.47	5% poor shape
Onaway	477	415	87	3	14.94	3.5% knobby; 3% growth cracks; 2% skin spot
Chippewa	454	409	90	3	15.38	6% skin spot
Pungo	424	399	94	3	17.05	2% skin spot; 1% growth cracks and knobby
Houma	421	375	89	7	16.84	2% skin spot; 1% knobby
Avon	391	360	92	3	15.99	4% skin spot
Plymouth	369	343	93	2	16.84	4% knobby
Huron (Wis.)	343	295	86	9	16.84	3% knobby
Russet Burbank	335	201	60	9	16.68	30% knobby
Teton	327	311	95	4	15.57	1% skin spot
Cobbler	324	301	93	5	15.57	1% skin spot
Keswick	312	306	98	2	16.42	--
Green Mountain	309	253	82	8	17.68	9% knobby
Fundy	296	278	94	2	17.68	3% skin spot; 1% growth cracks
Merrimack	250	230	92	4	15.99	4% knobby and growth cracks
Antigo	246	212	86	6	16.21	1% growth cracks; 6%
Huron (N. Y.)	223	169	76	16	16.84	4% knobby

* Two in. minimum

NEW YORK

E. E. Ewing, E. D. Jones and Ora Smith

Nine potato variety trials were conducted in six New York counties in cooperation with the respective County Agricultural Extension Service Agents. All but two were located in commercial potato fields and were cared for by the growers. Two trials were located on the Varna Experiment Station farm. The Genesee County trial was on a muck soil. The other trials were on mineral soils.

Foundation seed of Avon, Fundy, and F 5350 was obtained from the Potato Research Station, Fredericton, New Brunswick. Certified seed of Antigo was supplied by Starks Seed Farm, Rhinelander, Wisconsin. Seed of Haig and Excel came from the Nebraska Certified Potato Growers Cooperative. The North Dakota Agricultural Experiment Station provided seed of Norland and Norgleam. Foundation Navajo seed and certified Blanca seed was obtained from the Potato Certification Service office in Fort Collins, Colorado. Professors L. C. Peterson and R. L. Plaisted furnished seed of the following Cornell University lines: JDS-1, ISO-1, ISO-2, JGQ-1, KKK-5, JLS-6, and KBW-8. Seed of the other 26 varieties was provided by the USDA Station at Presque Isle, Maine.

Each experiment was composed of four randomized complete blocks. Individual plots consisted of single rows 25 feet long. Row spacings were 34 inches between paired (planter) rows and approximately 36 inches between unpaired rows, except that the spacing in Genesee County was 32 inches between paired rows. Seed pieces of Russet Burbank were spaced 16 inches apart within the row; all other varieties were spaced at 8 inches. Seed pieces weighed approximately 2 ounces.

Because of prolonged wet weather during the last part of May it was not possible to plant seed in several of the trials until much later than was originally planned. As a result, seed for several of the trials was cut far in advance of planting. Stand counts for these trials are presented in New York Tables 4-8.

In addition to the trials described above, all varieties were planted at two locations for evaluation of scab resistance. For these tests 3-hill plots were planted in soil where scab had been a problem in the past. Three seed pieces of Red Pontiac were planted after each plot to separate adjacent plots and to serve as a reference standard for incidence of scab. There were six replications at each location.

Ten tubers were drawn at random from each plot in the scab trials and individually rated for extent and type of scab lesions. The Red Pontiac tubers between the plots were also rated. From the rating for surface area covered and type of lesion an overall rating was obtained by entering a two-way table (see New York table 6, p. 167, Report of National Potato Breeding Program for 1959). The ratio of the mean variety score to the mean score of the Red Pontiac tubers on each side of the plot was computed. Plots surrounded by Red Pontiac tubers which rated less than "8" (corresponding to 11-20% of the tuber covered with raised or slightly pitted lesions) were not included in the data. The percentage of tubers with scab in excess of U. S. No. 1 tolerances was also computed for plots where Red Pontiac rated higher than "8".

The 1960 growing season in upstate New York was marked by a very wet spring, a cool, dry summer, and a mild, dry fall. The Monroe County trial was almost completely lost due to water damage after planting and will not be reported here. The Erie County Trials and, to a lesser extent, those in Genesee and Onondaga Counties, suffered from drought. The Tompkins County trials on the Sheldrake farm and at Varna were irrigated regularly. The other trial in Tompkins County (Haines farm) received ample water from natural precipitation throughout the growing season.

Very little scab developed in the Franklin County scab evaluation trial. In the Wayne County trial (muck soil) scab was serious in only part of the trial. Results are presented in New York table 9 for those varieties which had three or more replications falling in the heavily infested zone. Plymouth, Haig, Early Gem, and Norland showed good scab resistance. Of the unnumbered varieties, B 4093-18 and B 4212-1 had good resistance. Unfortunately, B 4093-18 did not seem to be horticulturally acceptable (see New York table 8).

Total yields, yields of U. S. No. 1 potatoes, specific gravities, and grading data from the other variety trials are presented in New York tables 1-9.

Of the varieties included for the first time in 1960, Avon looked very promising when dug as an early variety in Erie County due to its tough, white skin and uniform appearance. At other locations, where it was allowed to become fully mature, it was unimpressive because of its irregular shape and deep eyes, especially at the apical end of the tuber. Fundy had excellent tuber type and acceptable yields for an early variety. Main drawbacks appeared to be susceptibility to scab and a rather unattractive skin, especially when allowed to mature completely.

Another new entry which performed very well was the red-skinned variety Excel (see New York tables 4 and 7). At both locations it gave satisfactory yields, a high percentage of No. 1 tubers, and produced tubers equal to or superior to Katahdin in shape and smoothness. Tuber size was somewhat less than Katahdin and it probably should be given a slightly wider spacing.

Two other varieties which appeared to require wider spacing were Blanca and Navajo. Both had high percentages of "B"-sized tubers. At several locations Blanca showed a tendency to develop "elephant skin," a checking or shallow cracking of the skin resembling russet scab. For the second year Norland looked good as an early variety. Due to its low specific gravity and tendency to darken when cooked after storage (see New York tables 10, 13, 14), it is recommended only for the early market in New York.

The numbered varieties JGQ-1, ISO-1, ISO-2, and JLS-6 were very similar to Katahdin in yield, tuber type, and specific gravity. (New York tables 5 and 6). JLS-6 was especially noteworthy because of its excellent tuber type.

Katahdin produced significantly better yields than any of the numbered varieties in the Varna trial (New York table 8) except for B 3599-11 and B 3653-15. Total yields of B 3599-11 were very good, but there were many misshapen tubers and the specific gravity was below the specific gravity of Katahdin. Preliminary tests indicated that both B 3599-11 and B 3653-15 accumulated reducing sugars and would be unacceptable for chipping.

As can be seen from the emergence figures presented in New York table 8, several of the seedlings produced very poor stands. Inasmuch as three weeks elapsed between seed cutting and planting, the yields obtained in this trial for the varieties producing poor stands should not be considered representative of the yielding potential of such varieties under normal conditions.

New York tables 10-14 show the results of chipping tests on varieties from the 1959 trials. Potatoes from each trial were chipped three times: within a few weeks after harvest; after three month's storage at 50°F.; and after four month's storage at 40°F. followed by one month at about 50°F. and two weeks at room temperature. Chip color was measured by a Hunter Color Difference Meter. Meter readings above 17.0 are generally considered to indicate satisfactory chip color; readings below 17.0 are considered too dark. Values listed represent the means of two determinations.

Potatoes at all locations except Franklin County were chilled somewhat prior to digging and/or while in growers storages. Consequently, only the Franklin County trial gave light colored chips at the first frying, and the potatoes from the other trials stored at 50°F. made darker chips than might otherwise have been the case.

Also shown in Tables 10-14 are ratings for degree of after-cooking darkening of potatoes from the 1959 trials. Potatoes were cooked after about 8 month's storage. The varieties Norland and Tawa had a pronounced tendency to darken in all three of the trials in which they were included.

New York table 1. Potato Variety Trial (early), Erie County, 1960.

Variety	Yield per acre				Less				Greater				Misshapen and growth cracks		Specific gravity	Notes
	U.S.No.1 Over 2"		Total		U.S.No.1		than 2"		than 4"		Sunburn					
	Cwt./A	Cwt./A	Cwt./A	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.				
Fundy	142	193	73.5	25.0	0	0.6	0	1.085	Eyes similar to Chippewa in depth. Well shaped.	0	1.4	1.080	Smooth shape. Uniform size. Redskin not as dark as Red Pontiac.			
Norland	137	197	69.6	28.3	0	0.4	0									
Norgleam	134	183	73.5	19.4	0	2.3	0	1.082	Good size. Shape not quite as good as Fundy.	3.1	0.7	1.086	Irregular shape, deep eyes, small.			
I. Cobbler	106	187	57.0	40.3	0	0.8	0									
Onaway	103	171	59.8	28.5	0	3.1	0	1.086	Some very deep growth cracks. Appearance generally poor.	6.1						
D .05	44	43						0.008								

Fertilization: 1650 lbs. 10-10-10/A. in bands at planting.
Seed cut April 16.
Planted April 20.
Harvested July 26.

New York table 2. Potato Variety Trial (second early), Erie County, 1960.

Variety	Yield per acre				Less		Greater		Misshapen and growth cracks		Specific gravity	Notes
	U.S.No.1 Over 2"	Total	U.S.No.1	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.		
Avon	163	217	75.1	22.2	0	0.5	1.5	1.090	Eyes deeper than Chippewa, especially at apical end. Otherwise excellent appearance. Uniform size. Skin very white, little "feathering."			
Pungo	142	212	67.0	24.9	0	2.1	5.6	1.091	Medium size. Rather irregular in shape. "Feathering" about like Chippewa.			
Antigo	136	214	63.7	32.0	0	0.4	2.3	1.078	Good size and appearance except badly "feathered."			
Plymouth	135	221	61.1	22.3	0	4.4	2.6	1.087	Good average size.			
Chippewa	132	200	66.1	28.2	0	2.0	2.2	1.078	Good size and appearance, but badly "feathered."			
Haig	86	198	43.3	55.5	0	0.8	0	1.082	Russet skin. Small tuber size, but good shape.			
D .05	39	37						0.004				

Fertilization: 1650 lbs. 10-10-10/A. in bands at planting.
Seed cut April 16
Planted April 20
Harvested July 26

New York table 3. Potato Variety Trial, Tompkins County (Sheldrake Farm), 1960

Variety	Yield per acre		U.S.No.1		Total		U.S.No.1		Less		Greater		Sunburn		Misshapen		Specific gravity	Notes
	Cwt.	U.S.No.1 (Over 1 7/8")	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	than 1 7/8"	Pct.	than 4"	Pct.	Cwt.	Pct.	and growth cracks	Pct.		
Chippewa	367		424	86.4	6.6	0.6	0.1	1.0	1.077	2 of 20 large tubers had hollow heart.								
Plymouth	344		397	86.7	7.1	0	0.9	2.7	1.085	7 of 15 large tubers had hollow heart.								
Pungo	341		398	85.5	3.6	0.8	1.1	3.2	1.087	9 of 30 large tubers had hollow heart.								
I. Cobbler	333		412	80.9	10.9	0	0.2	2.1	1.083	9 of 20 large tubers had hollow heart.								
Antigo	308		357	86.4	7.7	0	0	1.3	1.081	0 of 15 large tubers had hollow heart.								
Fundy	308		365	84.2	6.4	0.5	0.2	3.7	1.081	4 of 15 large tubers had hollow heart.								
Norland	286		343	83.4	10.9	0	0	1.1	1.070	0 of 15 tubers (none large) had hollow heart. One replicate was in very poor spot in field, had low yield.								
Norgleam	259		317	81.2	4.2	0.8	0.1	6.4	1.074	3 of 20 large tubers had hollow heart.								
D .05	136		137						0.010									

Seed cut April 18.

Planted April 22.

Harvested August 5.

New York table 4a. Potato Variety Trial, Genesee County (muck), 1960.

Variety	Yield per acre		Specific gravity	Stand	Notes
	U.S.No.1				
	(over 2")	Total			
	Cwt.	Cwt.		Pct.	
Sebago Excel	377	443	1.089	93	Ran large. White skin. Not as well shaped as Katahdin.
	367	424	1.089	91	Red skin. Very good shape. Excellent appearance. Stems tend to hang on.
Katahdin Russet Sebago Kennebec Plymouth Blanca Avon	367	423	1.090	89	Some "cat-face" otherwise excellent appearance.
	345	405	1.089	91	Russetting somewhat blotchy. Otherwise resembled Sebago.
	314	473	1.087	93	Not nearly as regular in shape as Katahdin.
	289	360	1.086	88	
	279	342	1.089	84	Ran small. Buff skin. Shape fairly good.
	273	341	1.089	91	"Cat-face" most serious fault in appearance. Irregular in shape.
Delus Cherokee	270	370	1.092	83	Ran large. Somewhat irregular in shape.
	244	339	1.086	90	Skin white, shiny, but "cat-face" and irregular shape made appearance only fair.
F 5350 Navajo Fundy Huron	242	300	1.089	78	Appearance fairly good.
	241	302	1.089	94	Tan skin. Ran small. Tuber width greater than tuber length
	235	271	1.082	88	Shape good. Skin not very smooth or white.
	220	341	1.088	84	Very white skin. Shape irregular, with considerable "cat-face."
Early Gem	209	305	1.072	86	Nice skin russetting. Many growth cracks. Elongated tubers. Generally good appearance.
R. Burbank	138	337	1.087	97	Knobs, dumb-bells, etc., severe.
D .05	118	117	0.009		

Fertilization: 1500 lbs. 6-12-12 broadcast before planting.

Seed cut May 15; Planted May 26; harvested October 11.

New York table 4b. Potato Variety Trial, Genesee County (muck), 1960

Variety	U.S.No.1 Pct.	Less than 2"	Greater than 4"	Sunburn Pct.	Misshapen and growth cracks Pct.
Sebago	85.0	5.3	3.3	4.1	2.2
Excel	86.4	11.6	0	1.0	0.8
Katahdin	86.7	5.1	3.6	2.6	2.0
Russet Sebago	85.0	7.3	1.9	2.3	3.6
Kennebec	66.4	9.7	2.7	10.3	11.0
Plymouth	80.2	5.3	0.8	6.2	1.7
Blanca	81.6	15.6	0	2.1	0.7
Avon	80.1	8.0	3.0	1.2	7.9
Delus	73.0	6.7	7.3	5.3	7.5
Cherokee	72.0	12.2	1.5	2.3	11.9
F 5350	80.6	9.0	1.6	2.8	6.0
Navajo	79.7	16.1	0.5	2.0	1.6
Fundy	86.7	6.8	0	2.6	3.8
Huron	64.6	13.5	1.1	4.9	16.1
Early Gem	68.5	13.7	0	6.2	11.7
R. Burbank	41.0	20.1	0	4.0	35.0

New York table 5a. Potato Variety Trial, Onondaga County, 1960.

Variety	Yield per acre				Skin checking	Specific Gravity	Stand Pct.	Notes
	U.S.No.1 (over 2")		Total					
	Cwt.	Cwt.	Cwt.	Pct.				
Russet Sebago	308	350	0	1.079	99	Somewhat blotchy in russetting. Ran large.		
Sebago	287	345	0	1.080	99	Ran large.		
Russet Rural	282	306	0	1.083	99	Well-shaped. Good appearance.		
JGQ-1	263	286	0	1.078	99	Good uniformity of size. Good appearance.		
ISO-2	260	286	0.7	1.075	99	Well-shaped.		
Katahdin	257	277	0	1.076	98	Well-shaped.		
JDS-1	232	259	0	1.078	99	Fairly well-shaped.		
KLK-5	237	286	9.3	1.072	100			
ISO-1	236	255	0	1.078	100	Short, thick tubers. Well shaped. Good size.		
Avon	232	249	1.0	1.080	93	Irregular in shape; deep apical eyes.		
Blanca	252	272	3.9	1.079	95	Many tubers showed unattractive skin cracking.		
Navajo	206	229	0.4	1.081	97	Ran small.		
D .05	83	77		0.005				

Fertilization: 1700 lbs. 8-16-16 in bands at planting.

Seed cut May 11

Planted June 6

Harvested October 5

New York table 5b. Potato Variety Trial, Onondaga County, 1960.

Variety	U.S.No.1		Less than 1 7/8"		Greater than 4"		Sunburn		Misshapen and growth cracks
	Pct.		Pct.		Pct.		Pct.		
Russet Sebago	87.8		5.2		2.6		3.2		1.2
Sebago	83.3		4.1		6.1		4.3		2.3
Russet Rural	92.2		5.8		1.2		0.3		0.5
JGQ-1	92.0		5.7		0.7		1.2		0.3
ISO-2	90.8		4.9		0.6		2.6		0.2
Katahdin	92.6		3.2		1.8		1.8		0.6
JDS-1	91.7		5.3		1.2		1.0		0.7
KLK-5	83.0		4.0		0		0.4		3.3
ISO-1	92.7		4.6		0.8		1.8		0
Avon	93.0		1.9		0		2.1		2.1
Blanca	79.3		15.5		0.7		0.3		0.4
Navajo	89.8		6.7		0		1.2		1.7

New York table 6a. Potato Variety Trial, Tompkins County (R. Haines farm), 1960.

Variety	Yield per acre		Skin checking	Specific Gravity	Stand	Notes
	U.S.No.1					
	(over 2½")	Total				
	Cwt.	Cwt.	Pct.		Pct.	
Russet Rural	328	414	0	1.079	99	Shape fair.
Kennebec	308	413	0.3	1.076	93	Tuber size ran very large. Elongated.
Sebago	301	418	1.0	1.073	99	Shape good.
JLS-6	294	353	2.0	1.070	99	Shape equal to or superior than Katahdin. Apical eye more shallow than in Katahdin. Less flattened and somewhat more elongated than Katahdin.
Katahdin	292	394	1.2	1.070	99	Tuber shape good.
KBW-8	248	313	2.5	1.075	97	Shape fair to good.
Plymouth	231	347	7.9	1.069	99	
Fundy	216	283	0.5	1.066	0	Well-shaped tubers.
Chippewa	216	284	0.3	1.062	91	Feathering more serious than in other varieties. Shape good but not outstanding.
KLK-5	206	427	23.1	1.061	100	
Norgleam	196	268	0.1	1.067	99	Skin more "clear" than Fundy skin. Shape medium. Eyes prominent but shallow (long "brow").
F 5350	164	251	2.2	1.069	87	Shape satisfactory, but many had unattractive skin cracking.
D .05	80	103		0.008		

Fertilization: 1600 lbs. 9-18-18/A. in bands at planting. Seed cut May 23; planted June 6, harvested Oct. 18.

Misshapen and

Variety	U.S.No.1		Less than 2"		Greater than 4"		Sunburn		Misshapen and growth cracks	
	Pct.		Pct.		Pct.		Pct.		Pct.	
Russet Rural	85.1		14.1		2.9		0.3		3.6	
Kennebec	74.7		5.5		9.2		3.2		7.0	
Sebago	72.0		17.0		4.7		2.4		2.8	
JLS-6	83.3		11.5		1.4		0.8		0.9	
Katahdin	74.1		14.7		5.1		3.9		1.0	
KBW-8	79.1		15.3		1.5		0.5		1.1	
Plymouth	66.5		13.3		3.2		2.7		6.4	
Fundy	76.3		17.9		1.9		0.5		2.9	
Chippewa	76.1		19.6		2.2		0		1.9	
KLK-5	48.3		12.3		0.7		1.6		13.9	
Norgleam	73.3		16.8		2.4		0.8		5.9	
F 5350	65.2		27.8		0		0		4.6	

New York table 7. Potato Variety Trial, Tailby Farm, Varna, 1960.

Yield per acre		Less than Greater than Specific				Notes	
U.S.No.1		Total		U.S.No.1		gravity	
(over 1 7/8")		Cwt.		Pct.		Stand	
Variety							
Russet Sebago	292	350	83.5	8.3	0.5	1.069	83
Excel	280	323	86.6	11.6	0	1.076	93
Sebago	274	337	81.1	10.7	0.5	1.070	89
Kennebec	253	358	70.7	10.7	0	1.073	92
Katahdin	241	269	89.3	8.5	0	1.071	89
Russet Rural	222	299	74.3	9.6	0	1.076	81
Blanca	185	240	77.3	20.7	0	1.078	81
Plymouth	184	212	86.7	7.7	0	1.073	91
Avon	176	208	84.7	10.4	0	1.077	84
Navajo	175	215	81.3	15.1	0	1.080	91
Delus	138	175	78.8	6.7	2.0	1.080	70
Haig	119	150	79.2	18.7	0	1.072	91
D .05	80	94				0.007	

Fertilization: 500 lbs. 12-12-12/A., plowed down, 275 lbs. 12-12-12/A. in bands at planting, 25 lbs. urea

(45% N)/A. through sprayer July 6. (Temperature was about 75°F. when urea was applied.)

Seed cut May 7. Planted May 28. Harvested October 12.

New York table 8. Potato Variety Trial, Seedling Varieties, Tailby Farm, Varna, 1960.

Variety	Yield per acre		U.S.No.1		Total		U.S.No.1		Less than		Greater than		Specific gravity	Stand	Notes
	(over 1 7/8")		U.S.No.1		Total		U.S.No.1		1 7/8"		4"				
	Cwt.	Cwt.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Pct.	Pct.	Pct.	Pct.			
B 3599-11	270	399	67.6	7.4	0	1.068	91	Good size. Shape medium. Growth cracks and misshapen tubers prevalent.							
Katahdin	220	248	88.9	6.2	0	1.073	93	Sized up well. Medium smooth shape. "Catface" fairly prevalent.							
B 3653-15	171	239	71.5	22.5	0	1.076	80	Chapped skin. Rather small. Shape fairly good.							
B 3319-30	144	218	66.1	12.1	0	-----	95	Irregular shape. Shallow netting.							
B 4159-2	125	185	67.5	14.0	0	-----	85	Main defect was growth cracking. Fair shape.							
B 3626-13	113	149	76.3	20.5	0	-----	90	Ran small. Shape fairly good.							
B 4160-1	88	150	58.4	19.5	0	-----	81	Severe growth cracking.							
B 2922-26	81	103	78.5	16.5	0	-----	72	Good size. Shape fairly good, but a few very deep growth cracks.							
B 4093-18	78	173	45.2	3.9	0	-----	85	Irregular shape. Unattractive, extremely heavy netting. Severe "cat-face."							
B 3726-6	56	93	59.4	18.7	0	-----	32	Many "dumb-bells." Elongated. Otherwise fairly good appearance.							
B 4212-1	34	50	66.9	25.7	0	-----	46	Red skin. Satisfactory size and shape.							
B 3454-14	9	21	40.6	49.0	0	-----	45	Red skin. Small. Irregular shape.							
D .05	63	77				0.005									

Fertilization: 500 lbs. 12-12-12/A. plowed down, 275 lbs. 12-12-12/A. in bands at planting, 25 lbs. urea (45% N)/A. through sprayer July 6. (Temperature was about 75°F. when urea was applied.

Seed cut May 6. Planted May 28. Harvested October 12.

New York table 9. Scab incidence in Wayne County (muck) variety trial, 1960.

Variety	Ratio of scab index of variety to scab index of Red Pontiac standard (means of 3-5 repli- cations)		Percent of tubers with scab exceeding U.S.No.1 tolerance
B 4093-18	0		0
Plymouth	.02		0
Haig	.02		5
Early Gem	.04		0
B 4212-1	.06		0
B 3726-6	.07		5
Norland	.08		0
KLK-5	.08		0
Cherokee	.14		3
B 2922-26	.17		25
B 3653-15	.17		8
F 5350	.20		17
Sebago	.21		22
ISO-1	.27		50
Kennebec	.42		35
Delus	.54		41
ISO-2	.61		32
Chippewa	.68		53
Fundy	.71		58
Norgleam	.87		74
Irish Cobbler	1.14		71

New York table 10. Monroe County (Dunn Farm). Chipping and boiling colors, 1959 trials.

Variety	Chip Color, Rd. Values			Rating for whiteness after boiling ^{1/}
	From Field	From 50°F. storage	From 40°F. storage after conditioning	
Tawa	26.8	17.5	13.7	8.0
Sebago	24.6	23.1	16.0	8.7
Merrimack	19.1	12.3	15.8	8.8
13-35 (source 1)	16.1	18.3	10.0	8.4
I. Cobbler	14.6	15.0	12.2	8.8
Plymouth	13.0	13.9	11.0	8.3
Norland	12.5	13.8	7.3	7.1
13-35 (source 2)	9.9	9.0	10.9	---
			D .05	0.8

^{1/}Where 9 = white, 1 = severe after-cooking darkening. Means for 5 tubers from each of the 4 replications.

New York table 11. Monroe County (Hopkins Farm). Chipping and boiling colors, 1959 trials.

Variety	Chip Color, Rd. Values			Rating for whiteness after boiling ^{1/}
	From Field	From 50°F. storage	From 40°F. storage after conditioning	
Navajo	25.3	21.4	8.3	8.6
Delus	14.6	16.6	13.6	7.9
Katahdin	12.5	8.1	9.9	8.3
Kennebec	12.2	16.9	11.0	8.7
13-35	11.2	8.2	7.9	8.5
Huron	5.8	10.7	7.1	8.4
D .05 =				1.1

^{1/}Where 9 = white, 1 = severe after-cooking darkening. Means for 5 tubers from each of the 4 replications.

New York table 12. Wyoming County. Chipping and boiling colors, 1959 trials.

Variety	Chip Color, Rd. Values			Rating for whiteness after boiling ^{2/}
	From Field ^{1/}	From 50°F. storage	From 40°F. storage after conditioning	
Kennebec	19.7	10.2	9.5	----
Merrimack	15.4	----	9.7	----
ISO-2	14.7	----	10.3	----
Delus	14.3	11.9	13.1	----
JGQ-1	12.9	8.1	9.4	7.9
B 355-35	12.2	10.1	11.1	6.7
Katahdin	11.8	8.0	7.9	----
Russet Rural	11.3	11.6	15.0	7.2
JDS-1	10.9	9.8	9.4	7.4
JDN-9	10.8	----	5.1	----
ISO-1	10.6	10.2	8.2	7.1
B 3696-13	8.4	8.8	6.2	7.2
B 3140-36	8.3	5.5	4.8	7.4
13-35	8.2	6.8	8.0	8.0
D .05 =				1.2

^{1/}Actually held for 11 days in grower's storage prior to frying.

^{2/}Where 9 = white, 1 = severe after-cooking darkening. Means for 5 tubers from each of 4 replications.

New York table 13. Steuben County. Chipping and boiling colors, 1959 trials.

Variety	Chip Color, Rd. Values			Rating for whiteness after boiling ^{2/}
	From Field ^{1/}	From 50°F. storage	From 40°F. storage after conditioning	
Navajo	18.1	11.7	8.2	8.1
Kennebec	15.6	15.0	9.5	---
Tawa	15.1	11.6	7.5	6.6
JGQ-1	13.8	7.8	---	---
JDS-1	13.7	----	6.4	---
Osage	13.1	13.1	11.6	---
Norland	12.9	13.6	4.4	6.4
Delus	11.9	15.0	17.6	---
B 3454-5	11.4	9.4	6.5	---
Blanca	11.1	----	4.9	---
Katahdin	10.9	10.9	7.8	---
ISO-1	10.3	19.6	9.3	8.0
B 3172-13	10.2	11.7	5.9	---
Huron	9.9	8.0	3.9	8.0
Irish Cobbler	9.6	10.5	9.4	8.8
Plymouth	8.2	14.2	7.3	7.7
13-35	7.7	6.5	7.2	8.6
D .05 =				1.0

^{1/}Actually held for two weeks in grower's storage prior to frying.

^{2/}Where 9 = white, 1 = severe after-cooking darkening. Means for 5 tubers from each of 4 replications.

New York table 14. Franklin County. Chipping and boiling colors, 1959 trials.

Variety	Chip Color, Rd. Values			Rating for whiteness after boiling ^{1/}
	From Field	From 50°F. storage	From 40°F. storage after conditioning	
Katahdin	33.0	15.7	16.3	8.0
Osage	30.8	15.7	23.3	8.8
Tawa	28.4	12.0	13.5	6.8
Kennebec	28.1	16.1	16.6	8.5
B 4094-21	27.8	9.9	11.4	8.0
Blanca	27.5	10.6	9.0	---
Plymouth	25.7	14.4	11.2	7.8
Navajo	24.2	18.0	18.5	7.4
Irish Cobbler	21.1	14.7	14.2	9.0
Huron	20.3	12.5	7.3	8.6
Norland	17.0	12.7	6.0	6.6
B 3404-16	14.7	10.0	6.2	7.4
13-35	14.1	6.7	5.5	8.8

^{1/}Where 9 = white, 1 = severe after-cooking darkening. Mean for 5 tubers from single replication.

NEW YORK

R. L. Plaisted and L. C. Peterson

Recurrent Selection for High Specific Gravity: All possible combinations of crosses were attempted among 35 clones selected from the first cycle of recurrent selection. Of these, 338 were successful. The 35 parent clones were retested at Ithaca and Riverhead during the summer and of these, 17 have been saved. The seed of crosses among these 17 will be planted in the spring to start the next cycle of selection. Sixty other clones have been saved for further evaluation as possible varieties.

Inbreeding and Testcrossing: Over 3000 seedling hills of S1's of four lines with good general combining ability were grown. Of these, 232 were selected on the basis of their external appearance. These were tested for chip color and after-cooking darkening and 139 clones were planted in the greenhouse for another testcross. Most of these are selfs of La 1859 and I-1077-14. B 2458 selfs produced an above average number with poor chip color. B 2368-4 selfs were disappointing with respect to chip color and after-cooking darkening. This, of course, represents only a single growing season and a single location. Therefore, these observations should be treated with caution until more data are available for comparison.

Inheritance of Resistance to Golden Nematode in *Solanum vernei*: Five thousand seedlings representing crosses of a susceptible *vernei* clone and 10 clones with different levels of resistance were grown in infested soil at the Golden Nematode Laboratory at Hicksville. On the basis of the results from this test, further crosses will be made and evaluated.

Tuber Set as a Character for Selection in Seedling Hills: Seedling size tubers of Katahdin, Merrimack, and Pontiac ranging between 1/8 and 3/4 ounces were planted three feet apart and compared with cut size pieces at the same spacing and at a spacing of one foot. All the hills were dug by hand and the number of tubers over 1 7/8 inches and total number were recorded. Both data gave similar results, so only the 1 7/8" data will be described. The analysis of variance showed significant differences in varieties and treatments. Though it was smaller, the interaction between the two was also significant. In general, the varieties had a similar tuber set when planted at one-foot intervals. All three varieties showed an increase in tuber set when the same size cut pieces were spaced three feet apart, but the magnitude of the increase was different for each of the varieties. The relationship between size of small, whole tuber and tuber set is not clear. Apparently, its position relative to the other two treatments is influenced by variety. Though the number of hills observed was limiting (about 11 hills per variety per size) the varieties maintained about the same rank relative to one another from one seed size to the next. (Figures 1a and 1b).

In 1958, the number of tubers per seedling hill of 437 selected clones were counted. These clones were the progenies of crosses between Houma, Merrimack, Delus, Saco, and Green Mountain. The mean number of tubers per hill of these selected clones was 7.3. The range was from 2 to 22. The mode was 7. These clones were grown as 10-hill plots in Ithaca the next year. The mean number of tubers per seedling hill of the 69 clones selected was 7.6. The range was 4 to 20 and the mode, expressed as a ratio of the number selected to the number available for selection was 9. The selected lines were grown in replicated trials at

Figure 1 a

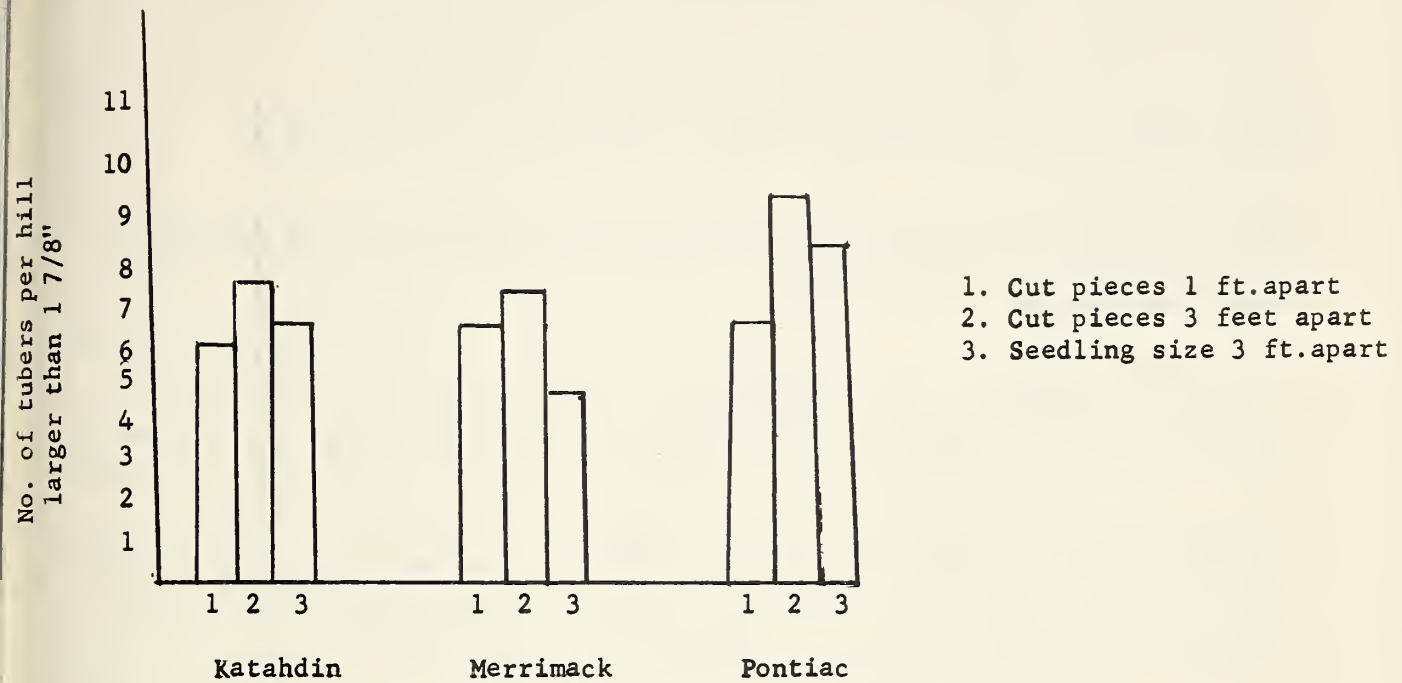
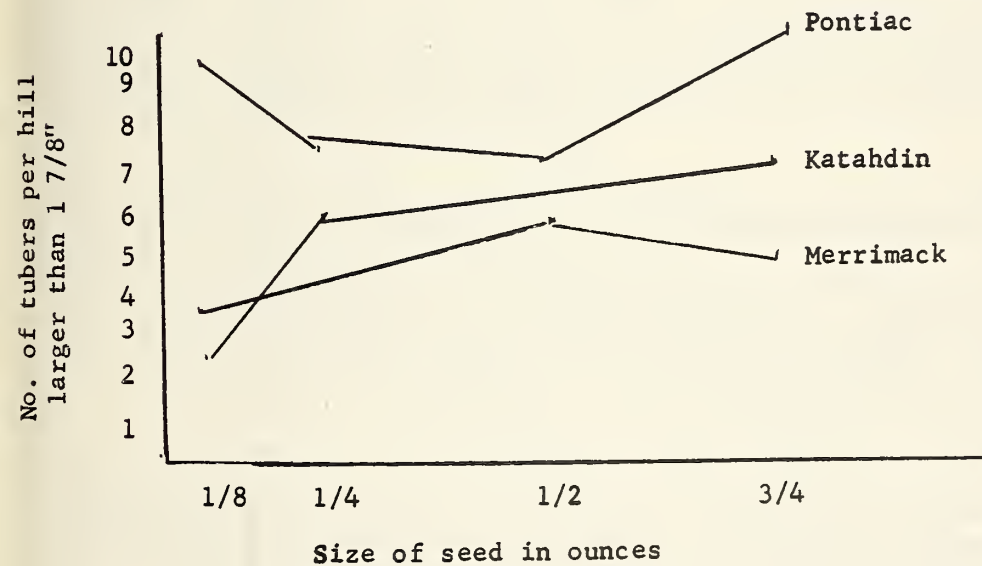


Figure 1 b



Ithaca in 1960. Of the 69, 18 were selected. These had a mean of 9.3. The range was 4 to 14 and the mode expressed as before was 11. In these progenies, it would appear there has been a tendency to increase the selection pressure in favor of heavier tuber set. However, the extensive range casts doubt on the value of this character in selecting seedlings. This variation was also evident in the experiment described first. The range in tuber set for the seedling size tubers (1/4 to 3/4 oz.) was as follows: Katahdin 3 - 19, Merrimack 3 - 11, Pontiac 5 - 20.

Golden Nematode: Resistance determinations were made at the Nematode Laboratory at Seaford, Long Island. Procedures employed in evaluating selections were the same as reported in previous years.

Both Solanum vernei and S. andigenum have been used as sources of resistance. Of these S. andigenum is used extensively, for, it is easier to handle and resistance appears controlled by a single genetic factor. In 1960, 18,000 new seedlings were tubered in the greenhouse and approximately 16,000 were grown in the field as single hills. About ten percent of the latter were saved for nematode and horticultural tests in 1961. In addition, 150 nematode-resistant selections made in 1959 were grown in yield trials at four locations, three on Long Island and one in up-State New York. Included among these were selections obtained from A. E. Schark, U.S.D.A., Presque Isle, Maine. Many selections compared favorably with Katahdin and 62, including 12 from the U.S.D.A., were saved for further testing.

	Range in Average Tuber Wt. per 10 hills above 2" minimum	Range in Average Specific Gravity
Andigenum derivatives	18.8 - 31.4	1.065 - 1.088
Vernei derivatives	21.2 - 27.2	1.068 - 1.080
Katahdin	21.0	1.072

As yet, virulent strains of the nematode have not been found in New York.

Black Spot: Procedures used in evaluating selections for resistance to black spot were the same as reported in previous years. All advanced selections are routinely tested. Considerable variability requires testing over a period of years before reliable results can be obtained. Many selections have been tested and six have maintained their resistance to black-spot throughout four consecutive years of yield-testing.

Blight and Scab: The best selections developed in one section of the program have been used as parental materials in other phases. Many selections being tested under the nematode program possess multiple resistance to several diseases. This is particularly true in the case of scab and blight.

NEW YORK (Long Island)

Richard L. Sawyer

Potato Variety Trials on Long Island, 1960

Because of the spread in planting season possible on Long Island, potato variety trials are conducted for both an early April and middle May planting. The results for both plantings are given in Sawyer tables 1 and 2. The early planting was made April 12 and the late planting May 13. A 1-1-1 ratio fertilizer was used at each planting supplying 175 pounds of nitrogen per acre. Spacing was 9 inches. The results are given for total U. S. No. 1's, U. S. No. 1's in the 2 to 3½ inch size range, and the percent total solids. The 2 to 3½ inch size makes a good small consumer pack.

In the early planting, Chippewa an early variety, outyielded everything else. However, a very large proportion of this total yield was in the very large size category, and the total solids content was one of the lowest.

Kennebec continues to be one of the most promising varieties for Long Island. It has consistently outyielded Katahdins in early planting, and consistently has a higher total solids content. It is good for both processing and table stock.

Marygold and Huron looked promising from both yield and total solids results. Huron, however, tends to become rough, sprouts quickly in storage and has a very high shrinkage.

Plymouth continues to look better than Cobbler as an early variety, taking yield, shape and total solids into consideration.

Blanca had the most uniform size of any variety included in the trials in recent years. Although the total yield was not high, 85 percent fell into the 2 to 3½ inch range. Approximately 50 percent of the other varieties fell into the 2 to 3½ inch range. Other spacing and fertilization ratios should be tried to see if the total yield can be improved.

Both seedlings B 3696-13 and 47156 looked good for total solids. B 3696-13 had a good yield and a fairly high proportion of potatoes in the 2 to 3½ inch size range in comparison with most entries.

Norland, as an early red, had excellent shape and uniformity of size but could not compare with the Red Pontiac in yield. Total solids of both were similar, low.

In the late plantings Kennebec was outstanding in yield. In previous years this variety has not done as good in late planting as this since it is a very late maturing variety. Merrimack had a good total solids reading but its yielding ability was disappointing as in previous years. Except for one or two exceptions, yields were better in the early planting, and total solids were considerably better in the early planting.

Sawyer table 1. Variety trial, late planting, 1960.

Variety	U.S. No. 1	2" - 3½"	Solids
	Bu.	Bu.	Pct.
Chippewa	716	320	15.8
Kennebec	707	350	17.3
Marygold	699	339	17.6
Huron	696	466	17.5
Red Pontiac	689	327	14.6
Katahdin	650	261	16.9
B 3696-13	645	379	18.2
Plymouth	634	299	17.6
Dazoc	597	378	17.1
Green Mountain	577	323	19.6
Irish Cobbler	549	400	18.0
Golden	527	334	15.6
Antigo	526	317	17.3
47156	525	279	18.1
B 4094-21	519	273	14.8
Merrimack	495	267	18.6
Blanca	485	413	17.3
Norland	481	346	15.0
Navajo	481	311	17.6
Haig	427	349	16.9
	MEAN SQUARES		
Replications	D. F. 5	274.3	15.9
Varieties	20	7147.6	256.2
Error	100	867.0	26.9

Sawyer table 2. Variety trial, late planting, 1960.

Variety	U.S. No. 1	2" - 3½"	Solids
	Bu.	Bu.	Pct.
Kennebec	792	410	16.50
Red Pontiac	724	383	14.20
Chippewa	639	438	14.42
Katahdin	608	282	15.73
Green Mountain	601	415	18.82
Huron	549	442	16.53
Plymouth	530	353	16.90
Irish Cobbler	522	382	16.30
Antigo	489	270	16.23
Merrimack	459	331	18.47
Navajo	459	322	16.57
Blanca	458	388	14.20
Norland	454	364	14.20
Dazoc	417	253	15.50
	MEAN SQUARES		
Replications	D. F. 5	73.7	86.9
Varieties	14	1070.1	343.6
Error	70	82.5	51.2

The following data in Sawyer table 3 and 4 are the storage results for the entries of 1959. The field results and cultural techniques were included in last years report which included an early and a late planting of most entries.

Storage Results 1959 Early Planting

Antigo, Osage, 606, Katahdin and Cobbler gave particularly low shrinkage results. Huron, Kennebec, Green Mountain and Saranac had particularly high shrinkage rates. Shrinkage for all varieties, particularly the late maturing ones, could be expected to be higher than usual in 1959 because of climatic conditions which lead to a poor skin.

Both Kennebec and Merrimac had low sprouting in storage. Delus and Osage also looked good from this standpoint.

Mohawk, 606, and Antigo had low black spot readings. Saranac, B 73-3 and Osage also had relatively low readings. Green Mountain, Kennebec, Merrimac, Huron and Delus had particularly high black spot.

Green Mountain had the highest specific gravity with Mohawk, B 73-3, Merrimac and Kennebec having readings of 1.080 or better, 1335 was very low.

Taking all storage characteristics into consideration, Mohawk, and B 73-3 looked the most promising. Antigo looks particularly good from all aspects save specific gravity.

Results are given in the following Sawyer table 3.

Sawyer table 3. Storage results for early planted variety trial, 1959.

Variety	Shrinkage		Sprouts	Black spot Index	Specific Gravity
	Pct.	Grams			
1. Katahdin	4.4	11.5		34.8	1.072
2. Merrimack	6.9	4.4		48.4	1.082
3. Cobbler	4.7	9.5		31.5	1.077
4. B 73-3	6.6	6.8		18.7	1.084
5. Kennebec	8.0	4.4		44.3	1.080
6. Delus	5.3	5.0		42.1	1.078
7. Green Mountain	8.4	12.3		40.1	1.089
8. Antigo	3.0	7.6		15.8	1.070
9. Plymouth	5.3	11.6		25.7	1.078
10. Mohawk	6.2	8.7		12.6	1.083
11. Saranac	8.6	13.3		18.3	1.071
12. Huron	11.7	8.9		42.7	1.078
13. 1335	7.0	10.8		33.9	1.060
14. Osage	3.8	6.4		19.2	1.071
15. 606	4.1	8.5		7.1	1.072
Mean Squares					
Source	D.F.				
Reps.	5	.89 = 0.9	6.6	320.0	42.20
Varieties	14	31.3	47.6	1031.9	313.86
Error	71	2.1	3.5	149.6	89.89

Storage Results 1959 Late Planting

Katahdin, Antigo, Cobbler, Green Mountain, B 73-3, Mohawk and Osage fell at the lower level in shrinkage. Huron had a particularly high shrink and Kennebec, Merrimack and 1335 had high shrink. With Kennebec and Merrimack, this probably reflects their need for a long growing season to mature and have well set skins at harvest.

Huron had the most sprouting with Merrimack and Delus having no sprouting at all after four and a half months at 50° F.

Saranac and Antigo looked particularly resistant to black spot. Merrimack, Cobbler, Delus, 1335 and Osage appeared to be most susceptible.

B 73-3 had a very good specific gravity. Antigo, Saranac, 1335 and Katahdin all had specific gravities less than 1.070.

Of the new entries B 73-3 looked the best taking all storage characteristics into consideration.

The following Sawyer table 4 gives these results.

Sawyer table 4. Storage results for late planted variety trial, 1959.

Variety	Shrinkage	Sprouts	Black spot Index	Specific Gravity
	Pct.	Grams		
1. Katahdin	4.4	6.7	17.4	1.069
2. Merrimack	6.0	0	34.2	1.076
3. Cobbler	4.9	6.0	34.6	1.074
4. B 73-3	4.8	6.3	14.2	1.083
5. Kennebec	6.6	3.4	21.3	1.078
6. Delus	5.7	0	51.8	1.077
7. Green Mountain	4.9	4.4	18.6	1.080
8. Antigo	4.1	1.7	6.8	1.066
9. Plymouth	5.0	4.0	24.4	1.079
10. Mohawk	4.9	5.3	14.3	1.079
11. Saranac	5.7	4.5	4.5	1.063
12. Huron	9.1	8.3	20.9	1.076
13. 1335	6.5	4.5	33.7	1.067
14. Osage	4.8	2.1	30.5	1.072
Mean Squares				
Source	D.F.			
Reps.	5	1.5	8.4	161.9
Varieties	13	10.5	33.8	902.2
Error	66	3.2	3.9	83.1
				26.2

NORTH CAROLINA

F. L. Haynes and L. W. Nielsen

The potato-breeding program continued toward its primary objectives of breeding for high yielding, early maturing varieties with resistance to late blight, scab and southern bacterial wilt. Chipping quality is also emphasized in the program.

The 1960 evaluations of new varieties and breeding lines were conducted at 5 locations in the early section on the coast and at 2 locations in the mountains. Maintenance and primary selections are conducted at the mountain locations. Primary evaluations for the early commercial area are conducted at Plymouth, and advanced trials are located at Aurora, Camden, Columbia and Faison. Results of three of the advanced trials are presented in N. C. tables 1, 2 and 3.

Chipping quality was rated by a panel and was conducted by the Food Processing Section. The ratings used do not conform to standard ratings most widely used. The ratings were made by comparison with a scale upon which figures indicate darker chips. On this scale a rating of 50 is the darkest acceptable color and 70 is the lightest color acceptable. The results of the chipping evaluations are also presented in N. C. tables 1, 2, and 3.

Breeding for resistance to southern bacterial wilt (Pseudomonas solanacearum) is being continued. The level of resistance in breeding lines is typified by the results presented in N. C. table 4. This table presents data from an evaluation by inoculation conducted in the greenhouse. The variety Prisca (638) has the highest level of resistance available in parental lines. B 2969-15 has been reported to be highly resistant in Brazil, but was among the most susceptible in North Carolina.

Cytogenetic Studies

In 1959, a project was initiated to study the cytological and genetic relationships among the diploid species of the taxonomic series Tuberosa. Fifty-four clones representing 21 diploid species were received from the Inter-regional Potato Introduction Project, Sturgeon Bay, Wisconsin. These parental species have been studied cytologically, especially for meiotic behavior. Pairing relationships and distribution of the chromosomes in meiotic divisions have been analyzed in detail. Classification of the species for a wide range of genetic characters has been conducted. These include leaf, flower and tuber characters.

From interspecific hybridizations made in the greenhouse, a total of 105 different combinations produced viable seed. Within these combinations, there are 64 different interspecific hybrids. The remainder represent duplications of these same hybrids, but involve different clones. The F₁ populations of these hybrids are currently being studied.

North Carolina table 1. Performance Test - Aurora, Beaufort County. Plots 1/196 acre, 4 replications, randomized block design. $\frac{1}{1}$

Rank	Variety	Ave. yield per acre	Dry matter	Tuber maturity	Tuber appearance	Stand	Tuber color	Chip color	Remarks
		Cwt.	Pct.			Pct.			
1	56C10-1	330	14.5	Med.early	Good	99	White	35	
2	53C1-8	329	15.0	Early	Fair	97	Cream	40	Easily bruised.
3	53C3-7	309	15.8	Midseason	Fair	96	Cream	58	Easily skinned. Darkens rapidly.
4	Pungo	306	17.7	Med.early	Good	99	White	68	Tend to over-size.
5	56C12-5	292	13.9	Early	Good	97	Cream	25	
6	Cobbler	272	17.5	Med.early	Fair	96	Cream	68	
7	50B33-3	267	15.8	Early	V.good	87	White	66	Poor stand due to frozen seed Rep III
8	Keswick	266	17.7	Midseason	Good	97	White	66	Tends to over-size.
9	56C14-6	259	16.0	Early	V.good	93	White	66	
10	54B9-26	254	16.5	Med.early	Excellent	93	White	72	
11	53B2-2	247	16.2	Early	Good	95	White	60	Large percentage small tubers.
12	53C2-5	233	14.1	Midseason	Poor	97	White	35	Tubers darken rapidly after washing.
13	56C18-1	230	16.2	Midseason	Fair	98	White	70	Tubers too small.
14	Sebago	229	15.8	Med.late	Good	97	White	65	
15	50B9-2	222	16.5	Early	Fair	99	White	65	Tubers too small.
16	56C18-2	221	15.2	Midseason	Good	90	White	45	Tubers too small.
17	Katahdin	215	14.3	Midseason	Fair	96	White	65	
18	56C11-30	125	16.0	Early	V.good	85	White	50	Did not size.
	L.S.D.	.05	50						
	L.S.D.	.01	67						
	C.V. for yield (US #1-A) = 13.79%								

$\frac{1}{1}$ /Spacing - 10 inches

Width row - 40 inches

Yields are U.S. No. 1 - Size A

Fertilized - 2100 lb./A. 5-10-10

Planted - 3-2-60

Harvested 6-23-60

112 day season

North Carolina table 2. Performance Test. Camden County. Plots 1/196 acre, 4 replications, randomized block design.

Rank	Variety	Ave. yield per acre	Dry matter	Tuber maturity	Tuber appearance	Stand	U.S. No. 1-A	Tuber color	Chip color	Remarks
		Cwt.	Pct.			Pct.	Pct.			
1	53C1-8	271	13.7	Med.early	Good	94	90.8	White	30	Darkens rapidly after washing.
2	56C10-1	250	14.8	Med.early	Good	91	86.3	White	35	
3	Pungo	250	16.9	Med.early	Good	91	91.9	White	60	
4	53C2-5	246	13.7	Midseason	Fair	92	79.2	Cream	32	Knobby. Darkens after washing.
5	54B9-26	240	16.0	Midseason	Good	86	83.8	White	65	Many growth and air cracks.
6	53C3-7	237	14.5	Midseason	Good	88	90.4	White	35	
7	56C18-2	235	14.5	Midseason	Good	95	90.1	White	30	
8	53B2-2	227	15.8	Med.early	Good	92	85.2	White	53	
9	Keswick	227	16.2	Med.early	Fair	89	95.3	White	60	Tubers large-Tend to oversize.
10	56C12-5	222	13.5	Early	Good	93	87.7	White	28	
11	50B9-2	209	16.9	Early	Good	95	81.8	White	64	Tubers tend to be too small.
12	56C18-1	203	15.4	Med.late	Good	92	80.5	White	55	Tubers did not size.
13	56C14-6	190	15.0	Early	V.good	92	79.0	White	58	Large percentage B size.
14	Katahdin	188	14.3	Midseason	V.good	92	89.8	White	62	
15	Cobbler	179	16.0	Med.early	Fair	88	79.6	Cream	58	Considerable second growth.
16	50B33-3	173	15.0	Early	Good	88	85.3	White	58	Some second growth.
17	56C11-30	139	16.7	Early	V.good	89	68.0	White	40	Did not size.
18	Sebago	127	13.3	Late	Good	93	86.6	White	60	

L.S.D. .05 46

L.S.D. .01 61

C.V. for yield (US #1-A) = 15.14%

1/Spacing - 10 inches

Width row - 40 inches

Yields are U. S. No. 1, Size A

Fertilized - 2800 lb./A 5-10-10

Planted - 3-28-60

Harvested 7-6-60

99 day season

North Carolina table 3. Performance Test - Tyrell County. Plots 1/196 acre. 4 replications, randomized block design.^{1/}

Rank	Variety	Ave. yield per acre	Dry matter	Tuber maturity	Tuber appearance	Stand No.1-A	U.S. color	Chip color	Remarks
		Cwt.	Pct.			Pct.	Pct.		
1	56C18-10	370	15.4	Med.early	V.good	99	91.0	65	Vigorous vine.
2	53C3-7	365	15.6	Midseason	Fair	97	92.5	45	
3	56C5-6	335	16.0	Early	V.good	99	85.6	35	Some scab. Did not size.
4	Pungo	328	16.7	Midseason	Good	98	91.5	59	
5	53C1-8	322	14.1	Early	Good	98	94.7	36	
6	50B33-3	314	15.2	Early	Good	100	91.9	56	Small amount second growth.
7	56C12-12	313	17.5	Early	V.good	98	91.9	68	Very pretty. Did not skin.
8	50B43-4	311	15.2	Early	V.good	98	90.0	58	Very pretty. Did not skin.
9	53C2-5	296	13.7	Med.late	Poor	100	76.6	28	Skinned badly. Rough, scabby.
10	57C2-3	295	14.5	Med.late	Fair	97	90.8	60	
11	56C14-12	292	16.7	Midseason	V.good	97	82.0	58	Few growth cracks, large but smooth.
12	Keswick	285	16.0	Midseason	Good	96	95.4	65	Tends to over-size.
13	56C17-2	278	15.0	Midseason	Good	99	85.9	48	Did not size properly.
14	Cobbler	269	17.7	Early	Fair	99	90.5	59	Some scab.
15	ND3324-2	268	15.6	Med.early	V.good	98	86.8	62	
16	Sebago	217	13.5	Late	Fair	98	92.4	61	Some internal discoloration.
	L.S.D.	.05							
	L.S.D.	.01							
	C.V.	for yield (US #1-A) = 7.82%							

^{1/} Spacing - 10 inches
Width row - 40 inches
Yields are U. S. No. 1, Size A
Fertilized - 2500 lb./A 5-10-10
Planted - 4-1-60
Harvested - 7-7-60
98 day season

North Carolina table 4. Disease reaction index of potato clones inoculated with P. solanacearum during winter of 1959-60.

<u>Clone</u>	<u>Test I</u>	<u>Test II</u>	<u>Disposition</u>
Cobbler	5.0	4.7	
638 (Prisca)	0.8 ^{b/}	2.1	
56C8-3	3.5	4.6	discard
56C9-6	3.0	3.0	
56C9-10	1.7	2.7	
56C9-18	3.6	4.0	discard
57C6-5	1.7	2.1	
57C8-1	2.3	3.8	
57C8-2	3.7	3.8	discard
57C8-4	3.5 ^{b/}	4.3	discard
57C12-2	2.6	2.0	
58C2-1	3.5	4.7	discard
58C2-2	4.3 ^{b/}	4.7	discard
58C2-3	4.3	4.6 ^{b/}	discard
58C2-5	4.3	3.5	discard
58C2-8	2.6	2.5	
58C2-15	4.3	2.4	
58C2-16	4.8	4.0	discard
B2969-15 ^{a/}	5.0	5.0	
L.S.D. .05	1.6	1.0	
L.S.D. .01	2.07	1.3	

a/ This selection is obviously susceptible to our strains of the bacterium.
I would like to retain it and inoculate with the bacterium from Colombia.

b/ This mean based on fewer plants and not included in statistical analysis.

NORTH DAKOTA

R. H. Johansen, E. P. Lana, and A. P. Benson

The problem, objectives, and plan of work in potato breeding for North Dakota are similar to those reported in the 1951 report.

Potato Crossing Program

In 1960, 357 crosses were made in the horticulture greenhouse. The objective of most crosses was to combine disease resistance with good tuber type, red color, russeting, yield and high quality. Other crosses involved parents with good processing qualities, particularly flaking and chipping, combined with good horticulture characteristics.

Greenhouse and Field Seedlings

Approximately 30,000 seedlings representing 239 families were grown in the greenhouse during the summer and fall of 1960. At the Langdon Experiment Station, approximately 20,000 seedlings were grown in the field for progeny selection and study. Approximately 1500 clones were selected at harvest time.

Advanced Selections

Nine hundred and eighty-six advanced selections were grown under isolation from viruses and other diseases at the Langdon Experiment Station. To maintain stocks free of viruses, the greenhouse indexed seed plot was isolated from the non-indexed seed plot. The indexed seed plot consisted of seed stocks that were indexed in the greenhouse for visible virus symptoms and tested on indicator plants for the presence of virus X free seed. Seed stocks harvested at Langdon will be used for further increase and testing. Additional samples of most of the advanced selections were grown in scab and adaptation plots at Grand Forks, Park River, and Fargo. The testing of selections for scab resistance at Northwood was discontinued during 1960. Several advanced selections from other States and Canada were planted in adaptation plots at Grand Forks and Park River.

In 1960, seed stocks of several promising selections were distributed to ten certified growers in the Red River Valley, two certified growers in Golden Valley County (Beach, N. D.), and one certified grower at Cando, North Dakota. Selections distributed in 1960 were as follows: ND 4192-3, ND 4524-7R, ND 4468-1R, ND 3815-1R, ND 4121-25, ND 3740-11, and 3324-2. Several selections distributed prior to 1960 are now being increased in large plantings by several certified growers, and seed stocks of promising selections will be redistributed to other North Dakota growers.

Several advanced selections were grown and tested for virus diseases in Alabama and Florida by the North Dakota Seed Department.

A summary of selections and seedlings grown and those tested for further study follows:

<u>Age of clone</u>	<u>No. grown</u>	<u>Approx. No. saved</u>
1st-year seedlings	20,000	500
2nd-year selections	780	258
3rd-year selections	125	54
4th-year and older selections	77	52

Variety Trials

Replicated variety trials were grown at Grand Forks, Fargo, Park River, Minot, and with and without irrigation at Williston. The varieties were grown in plots of twenty-five hills and replicated four times in a randomized block. At Williston and Minot, the season's surface and subsoil moisture was very adequate during May and June, but during July and most of August, the trials suffered severely from hot and dry conditions. At Park River, Grand Forks, and Fargo, early season precipitation was generally favorable, but this was also followed by hot and dry conditions existing during the latter part of the season, particularly at Park River.

Spacing, fertilizer, soil type, planting date, and harvesting date of each location follows:

<u>Location</u>	<u>Spacing</u>		<u>Fertilizer applied</u>	<u>Soil type</u>	<u>Planting date</u>	<u>Harvest date</u>
	<u>Row</u>	<u>Plants</u>				
Fargo	38"	12"	300#/A 16-16-8	Fargo Clay	5/19	10/1
Grand Forks	38"	12"	300#/A 16-16-8	Bearden Clay Loam	5/20	9/27
Park River	38"	12"	300#/A 16-16-8	Glyndon Silt Loam	5/13	9/23
Minot	42"	16"	100#/A 18-46-0	Loam	5/18	9/21
Irrigation-	37"	16"	150#/13-39-0	Havre Silty Loam	5/16	9/16
Williston			Side-dressed 125# 33-0-0			
Dryland-	43"	16"		Williams Silty	5/16	9/16
Williston			100#/A 13-39-0	Clay Loam		

Twelve varieties and selections were grown in trial at Williston and Minot. Twenty-four varieties and selections were grown at Fargo and Park River, while twenty-two varieties and selections were grown at Grand Forks. Twelve varieties and selections were common at all six locations.

Trials at the North Dakota Experiment Stations located at Fargo, Minot, and Williston were conducted by the respective research personnel in charge. At Park River and Grand Forks, Mr. Robert Amstrup and Mr. Harry Earl, respectively, were in charge of the general maintenance of the trials. Tubers from all plots were harvested and weighed to obtain total and marketable yield. Marketable yield consisted of all tubers of U.S. No. 1 quality over two inches in diameter. Specific gravity determinations were made by the use of the potato hydrometer.

Red LaSoda with an overall average of 156 hundredweight produced the highest marketable yield of all varieties and selections grown in the State-wide trials (ND table 1). There was little difference in average yields between Red LaSoda,

Red Pontiac, ND 4121-25, and ND 3815-1R. All of these varieties and selections produced an average of over 150 hundredweight per acre. Kennebec produced an average yield of 142 hundredweight when grown at all locations. Cobbler, ND 4122-2, and ND 3740-11 produced almost identical total average yields. ND 3022-18, ND 4524-7R, and Fundy produced good yields and type when grown in trials in the Red River Valley. At Grand Forks and Park River, ND 4524-7R produced yields quite comparable to Red Pontiac. ND 4468-1R produced very high marketable yield when grown at Fargo, but was low in marketable yield when grown at the other two locations in the Red River Valley. The following varieties and selections grown in trial were russet skinned: ND 3740-11, ND 4192-3, Early Gem, ND 4129-5, ND 4192-1, and ND 3676-20. Of the russet varieties and selections, ND 3740-11 and ND 4192-3 produced the highest marketable yield. The type and shape of ND 4192-3 was superior to other russet-skinned varieties. Grade defects, except for undersized, were at a minimum for ND 4192-3. Its long slender shape was responsible for much of the undersize. When grown at certain locations, growth cracking was quite common in ND 3740-11 (ND table 1).

With inadequate moisture and high temperatures during July and August, the 1960 yields in the Red River Valley were lower than in previous years. Of the three locations in the Red River Valley, Fargo produced the highest marketable yield. In the western part of the State, the irrigated trial at Williston produced an average of 142 hundredweight (238 bushels) more than the non-irrigated. The trial at Minot averaged 120 hundredweight (199 bushels) per acre. The relatively good yields at Minot were attributed to the ample supply of moisture early in the season.

With averages ranging over 21.0 percent, Cobbler, ND 4122-2, and Norgleam produced the highest total solids, while ND 3324-2, Kennebec, Red LaSoda, ND 4121-25, ND 4192-3, and ND 3815-1R produced total solids that averaged over 20 percent. When grown in the Red River Valley, ND 3022-18 and Fundy averaged 21.4 and 20.6 percent total solids, respectively. At Park River this selection and variety both averaged 23.5 percent total solids. The average total solids (ND table 2) of all locations was 22.8 percent, with Minot producing the highest percent total solids and Fargo the lowest percent total solids.

Early Gem, ND 4122-2, Norland, ND 4121-25 showed the most resistance to scab.

In 1960, twenty-two varieties or selections were grown in the red trial at Grand Forks (ND table 3). In this trial, ND 4524-7R with a marketable yield of 199 hundredweight (331 bushels) per acre produced the highest yield. ND 4524-7R is a smooth, shallow-eyed red selection with resistance to late blight. Red LaSoda, ND 4286-11R, Ekre strain of Red Pontiac, Picha 15, Red Pontiac, Bounty, and 4468-1R all produced yields that averaged over 169 hundredweight (282 bushels) per acre. Although the Ekre strain of Red Pontiac outyielded the regular Red Pontiac, the yield difference was not significant. In the red trial, ND 4524-16R produced the highest percent total solids. This selection produced total solids of 22.4 percent, followed by ND 4286-11R and ND 4335-15R, which both produced 21.8 percent total solids.

Chipping tests

In 1959-60, several varieties and selections grown in trial at Grand Forks, Park River, and Williston were tested for chipping quality (ND table 4). All samples were stored at 40° F. from November until January, and then reconditioned at 70° F. until the final test was made in March. Samples were chipped immediately after removing from cold storage and at two-week intervals beginning January 11.

Samples from two replications were tested by frying a 100-gram sample of sliced potato in peanut oil at 345° F. Both samples were weighed before and after frying. Chipping quality was determined by the use of an arbitrary visual scale of 1-6 (1 dark, 6 light) for chip color and chip yield was calculated as percent recoverable of peeled-raw-sliced-potato weight.

The chips produced from the Park River trial were much lighter in color than those from the Grand Forks trial. At Park River, Norgleam, Kennebec, ND 3694-6, ND 3676-21, ND 3740-1, ND 3324-2, Navajo, ND 3022-18, ND 4122-2, and ND 4121-25 produced the lightest colored chips. All of these selections or varieties produced a color score that averaged four or better, which was considered as being highly salable. At Grand Forks, ND 3694-6, Kennebec, ND 3324-2, and CS 11889 produced the lightest chip color. When chipped immediately out of cold storage, the selection ND 3694-6 produced the lightest color. At both locations, ND 3022-18 and ND 3676-30 produced the highest chip yield. In the red trial at Grand Forks, only the selections ND 4419-2R and ND 4173-1R produced chips of acceptable quality (ND table 5). When comparing chip quality of irrigation vs. non-irrigation at Williston (ND table 6), the irrigated trial produced chips that were almost as light in color as the non-irrigated. This may be attributed to the high temperatures and low rainfall which existed during the 1959 season. The supplemental water added in irrigation lowered the soil temperatures and offered conditions more conducive to good plant growth. When grown under both dryland and irrigation, the varieties Cobbler, Kennebec, Norland, and Red LaSoda produced chips of light-brown salable color.

Culinary Test

Twelve varieties and 32 advanced selections grown at Grand Forks during 1959 were tested for cooking quality. The samples were boiled and tested immediately after for sloughing, mealiness, texture, flavor, and color and again for color four hours after boiling. The samples were baked and tested immediately after for mealiness, texture, color, and flavor. Samples were cooked immediately out of cold storage and after a two-weeks of reconditioning. Data reported in North Dakota table 7 represent the average quality score of the two tests. In testing for boiling, the varieties and selections that were mealy and very high in specific gravity generally sloughed or boiled to pieces. After cooking darkening was noted to be quite severe in the varieties Excel, Fundy, and the selections CS 11889 and ND 3694-6, however, several other varieties and selections showed some degree of after-cooking darkening. The selections ND 4121-25, ND 3324-2, ND 3631-5R, ND 4122-2, ND 4173-1R, ND 4173-3R, ND 4192-3, ND 4289-5R, ND 4289-14R, ND 4289-15R and ND 4468-1R, and the varieties Early Gem, Norgleam, and Red Pontiac were white after boiling and showed very little after-cooking darkening. In determining varieties and selections highly suited for boiling,

the selections ND 4122-2, and ND 4192-3, and ND 3324-2, and Norgleam showed very good quality in all tests. Varieties and selections that were medium high in specific gravity were generally the best for boiling. The baking test indicated that varieties and selections high in specific gravity were more mealy and had better baking quality. Cobbler, Fundy, Norgleam, ND 3324-2, ND 3676-20, ND 4121-25, and ND 4192-3 rated better in baking qualities.

Testing for Disease Resistance

Two hundred and five advanced selections were tested for resistance to scab and silver scurf at Park River and Fargo.

Prevalent scab types at Park River were superficial, while at Fargo both pitted and superficial types were present. Several selections from the Minnesota station were also tested. While these latter selections were relatively resistant to common scab, they appeared to be quite susceptible to superficial types.

Some North Dakota selections were resistant in both locations (N.D. table 8), and a few of these appeared to be quite resistant to silver scurf.

Screening for resistance to race "O" of late blight and immunity to virus X continued in 1960. Late blight symptoms were recorded after inoculated, detached leaves had been placed in a moist chamber for 6-8 days. Readings were based on lesion size and sporulation. Several selections were found both resistant to late blight and immune to virus X.

Data from virus Y field resistance trials (N.D. table 9) indicates ND 457-1 and its inbred progenies continued to show excellent resistance to that virus. Outcrosses using the S_1 of ND 457-1 gave a higher proportion of Y free progeny than did progenies derived from ND 457-1 or the ND 457-1 hybrid. Progress is apparently being made in concentration of genes for virus Y by this method.

Screening for virus Y resistance under field conditions is hazardous. Environmental conditions and vector infestation and survival is such that frequently results appear to be inconsistent. For this reason, large outdoor cages were adopted as a check method in 1959. Results were comparable (N.D. table 10) under both field and screened cage conditions. Results for 1960 are not available, but indications are that results will be similar.

Three first generation backcrosses of plants of (ND 457-1 x ND 3324-2) x ND 457-1 and (ND 457-1 x ND 3324-2) x ND 3324-2 were obtained. F_1 plants of these crosses were found to be immune to virus Y. Backcross progeny will be tested as soon as they are increased.

North Dakota table 1. Marketable yield in cwt. per acre and percent U. S. No. 1 of varieties and selections grown in State-wide potato variety trials, 1960.

Variety or selection	Fargo		Grand Forks		Park River		Minot		Dryland		Irrigation		Average	
	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.	Cwt.	Pct.
Red LaSoda	218	89	136	95	140	84	155	85	53	68	231	95	156 ¹ / ₁	86 ¹ / ₁
ND 4121-25	160	84	176	96	161	94	140	96	80	88	210	96	154	92
Red Pontiac	195	73	133	94	151	75	148	79	58	68	235	92	153	80
ND 3815-1R	184	97	147	99	155	93	135	92	74	88	213	97	151	94
Kennebec	173	83	150	93	154	84	107	71	70	76	198	90	142	83
Cobbler	182	89	129	88	146	87	104	76	61	74	185	91	134	84
ND 4122-2	143	83	134	95	135	86	117	77	68	79	208	95	134	86
ND 3740-11	160	73	98	69	154	89	117	80	54	77	210	92	132	80
Norgleam	164	91	137	94	116	88	97	86	54	81	202	93	128	89
Norland	164	83	103	79	141	86	108	76	55	73	182	94	125	82
ND 4192-3	149	75	116	83	135	84	100	63	41	57	202	85	124	75
ND 3324-2	128	79	130	92	131	79	108	75	46	69	153	90	116 ² / ₂	81 ² / ₂
ND 3022-18	184	92	156	97	168	94	108	75					169 ² / ₂	94 ² / ₂
ND 4468-1R	227	88	118	88	132	76							159	84
Fundy	175	91	156	94	122	87							151	91
ND 4524-7R	152	82	145	95	142	89							146	89
ND 4129-5	179	83	107	92	103	79							130	85
Early Gem	163	84	88	70	119	86							123	80
ND 3676-20	138	78	119	86	72	66							110	77
ND 4192-1	117	59	111	86	86	51							105	65
ND 4049-4	109	64	105	86	99	70							104	73
ND 3919-10	171	83			157	83							164 ³ / ₃	83 ³ / ₃
Bounty	167	81			105	60							136	71
ND 4337-4			120	98	117	90							119	94
Man. 5009-2	159	87											159	87
Average	165	82	128	90	131	82	120	80	60	75	202	92	137	83
L.S.D. 5%	42		33		35		17		11		48			
1%	55		43		47		23		15		64			
1/ Average 6 locations														
	2/ Average 3 locations						3/ Average 2 locations							

North Dakota table 2. Total solids of varieties and selections grown in State-wide potato variety trials, 1960.

Variety or selection	Williston							
	Fargo		Grand Forks		Park River		Dryland Irrigation	
	Solids	Pct.	Solids	Pct.	Solids	Pct.	Solids	Pct.
Cobbler	19.9		21.8		21.4		23.3	
ND 4122-2	18.6		22.2		20.3		23.3	23.1
Norgleam	18.2		21.2		20.7		22.7	23.1
ND 3324-2	17.3		21.6		19.9		22.9	22.7
Kennebec	17.7		19.2		18.8		22.9	21.6
Red LaSoda	19.2		19.9		18.4		22.9	21.8
ND 4121-25	17.7		20.3		20.1		22.0	23.3
ND 4192-3	18.0		20.7		19.7		20.9	22.4
ND 3815-1R	17.7		20.1		18.8		21.2	22.0
ND 3740-11	16.9		19.9		19.4		21.6	21.4
Red Pontiac	16.0		18.8		16.9		19.0	22.7
Norland	16.0		18.2		18.2		19.4	20.9
ND 3022-18	19.4		23.5		21.2		20.1	20.5
Fundy	19.4		23.5		19.0		19.7	18.6
ND 4049-4	18.6		22.7		19.7		21.2	18.5
ND 3676-20	18.2		21.8		19.9		19.2	21.42/
ND 4192-1	18.4		21.6		18.8		20.6	20.6
ND 4129-5	17.5		20.3		19.4		20.3	20.3
ND 4468-1R	17.1		19.7		19.0		20.0	19.6
ND 4524-7R	16.7		19.9		18.8		19.1	18.6
Early Gem	17.1		19.7		18.6		18.5	18.5
ND 4337-4			20.3		19.0		19.7	19.7
Bounty	18.4				18.4		18.43/	18.43/
ND 3919-10	16.5				18.2		17.4	17.4
Man. 5009-2	17.5						17.5	17.5
Average	17.7		20.7		19.2		21.2	19.9
L.S.D. 5%	0.2		0.2		0.2		1.0	1.2
L.S.D. 1%	0.4		0.4		0.4		1.4	1.8
1/ Average 6 locations					2/ Average 3 locations		3/ Average 2 locations	

North Dakota table 3. Red-skinned potato variety trial. Marketable yield in bushels and cwt. per acre, percent U. S. No. 1, and total solids of selections and varieties grown at Grand Forks, North Dakota, 1960.

Variety or selection	Marketable yield		U. S. No. 1	Total solids
	Bu.	Cwt.		Pct.
ND 4524-7R	331	199	96	19.7
Red LaSoda	313	188	93	19.7
ND 4286-11R	310	186	93	21.8
Red Pontiac (Ekre strain)	302	181	90	18.4
Picha 15	299	180	89	19.7
Red Pontiac	296	177	91	18.8
Bounty	292	175	90	20.9
ND 4468-1R	282	169	93	20.3
ND 4540-2R	274	165	96	19.2
ND 4524-16R	259	156	94	22.4
ND 4419-2R	256	153	80	20.7
I 1213-1	251	151	95	20.7
ND 3815-1R	242	145	96	19.4
ND 3631-5R	240	144	90	18.6
ND 4303-3R	235	141	91	20.1
Picha 5	229	138	77	20.0
ND 4559-6R	227	137	97	20.7
ND 4289-14R	224	135	95	20.5
ND 4289-15R	218	131	93	21.4
Norland	206	124	90	18.6
ND 4335-15R	203	122	96	21.8
ND 4335-9R	158	95	93	18.4
Average	257	154	91.6	20.1
L.S.D. 5%	38	23		0.2
L.S.D. 1%	50	30		0.4

North Dakota table 4. Chipping quality of varieties and selections grown at Park River and Grand Forks^{1/}

Variety or selection	Color ^{2/} Jan. 11		Color Jan. 25		Color Feb. 8		Color Feb. 22		Color Mar. 7		Color Average		Yield ^{3/} Average	
	PR	GF	PR	GF	PR	GF	PR	GF	PR	GF	PR	GF	PR	GF
Cobbler	3.2	1.3	3.9	1.8	4.7	2.3	4.7	3.9	5.0	4.0	4.3	2.6	33.8	31.9
Early Gem		1.3		1.3		2.2		1.5		1.4		1.5		30.4
Kennebec	3.4	3.4	5.6	3.5	5.5	5.0	6.0	5.1	5.9	5.8	5.3	4.6	32.5	32.1
Fundy	2.1	1.0	3.1	1.8	4.0	2.9	3.9	2.0	4.5	1.8	3.5	1.9	32.5	32.6
Navajo	3.2	1.4	4.3	1.5	4.8	3.8	6.0	4.0	5.9	3.0	4.8	2.7	33.1	32.2
Nordak	2.7	1.4	4.0	1.4	3.7	1.9	4.5	2.3	4.5	2.5	3.9	1.9	32.0	32.4
Norgleam	5.9	2.2	5.4	2.0	4.5	2.6	5.2	3.0	5.7	3.0	5.3	2.5	33.6	32.9
Norland	2.9	1.8	2.6	1.3	3.5	2.2	3.5	2.8	3.6	3.1	2.8	2.2	30.2	30.0

continued

North Dakota table 4, continued.

CS 11889	2.3	1.8	3.8	2.8	3.6	2.5	4.7	4.4	4.5	4.7	3.7	3.2	33.0	33.5
F 29-1	1.3	1.0	1.0	1.0	1.0	1.8	2.0	2.3	1.0	1.6	1.3	1.5	28.7	30.5
ND 3022-18	5.0	2.4	4.5	2.6	4.1	3.3	4.7	3.9	5.5	4.0	4.8	3.2	34.4	35.0
ND 3324-2	4.8	2.8	4.1	2.6	4.1	3.5	5.3	4.7	5.9	4.6	4.8	3.6	32.5	33.0
ND 3440-2		1.4		1.3		2.3		3.0		2.8		2.1		30.8
ND 3676-5		1.0		1.0		1.0		1.7		1.6		1.2		33.3
ND 3676-20	3.3	1.0	2.9	1.0	3.6	1.5	4.2	2.0	4.0	2.0	3.6	1.5	32.4	33.9
ND 3676-21	4.8	1.9	4.7	2.8	4.8	2.9	5.3	3.3	5.5	3.5	5.0	2.9	34.5	36.1
ND 3694-6	4.2	3.7	5.3	4.2	5.5	5.0	5.2	4.4	5.6	5.8	5.1	4.6	33.2	33.3
ND 3746-1	3.3	2.8	5.1	2.4	4.9	4.3	5.5	3.3	5.7	3.4	4.9	3.2	30.5	31.4
ND 3740-9		1.4		1.0		1.5		2.0		2.9		1.8		30.8
ND 3740-11	1.1	1.0	2.5	1.8	3.3	2.6	3.6	3.6	4.1	3.5	2.9	2.5	29.7	30.5
ND 3815-1R	1.3		2.0		1.3		3.0		3.4		2.2		31.6	
ND 3919-2	1.8	1.7	1.3	2.0	1.9	4.0	2.8	3.8	3.0	4.0	2.2	3.1	29.9	32.3
ND 4121-25	3.3	1.5	3.2	1.0	4.0	2.7	4.8	2.3	4.8	2.9	3.1	2.1	33.3	33.0
ND 4122-2	3.8	1.5	4.1	1.8	5.2	2.8	5.3	2.7	5.7	3.2	4.8	2.4	34.3	32.5
ND 4192-3	3.0	1.3	3.7	1.5	2.4	2.0	3.0	2.8	3.7	2.7	3.1	2.1	32.9	32.0
Average	3.2	1.7	3.7	1.9	3.8	2.8	4.4	3.1	4.6	3.2	3.9	2.5	32.3	32.3

1/ Samples were grown in 1959 and chipped during 1959-60.

2/ Color rating 1-6 (1 poor-dark, 6 good, very light brown).

3/ Percent chip yield.

North Dakota table 5. Chipping quality of red-skinned varieties and selections grown in trial at Grand Forks, North Dakota^{1/}

Variety or selection	Jan. 11		Jan. 25		Feb. 8		Feb. 22		Average	
	Color ^{2/}	Yield ^{3/}	Color	Yield	Color	Yield	Color	Yield	Color	Yield
Excel	1.0	29.7	1.0	28.7	1.7	30.1	2.8	32.2	1.6	27.8
Norland	1.0	28.6	1.0	26.7	2.3	28.7	2.9	27.4	1.8	30.1
Long 2.23	1.0	30.5	1.0	31.6	3.0	32.3	2.9	32.2	2.0	30.6
Picha 5	1.5	31.3	1.3	28.7	1.9	33.0	2.7	32.9	1.8	31.4
Picha 15	1.0	34.9	1.0	28.5	2.0	28.7	2.8	29.5	1.7	30.3
ND 3631-5R	1.0	29.3	1.0	28.7	1.5	30.2	2.4	32.0	1.5	30.0
ND 3699-5R	1.1	30.0	2.7	28.7	3.5	30.5	3.1	30.6	2.6	30.0
ND 3815-1R	1.0	31.4	1.0	27.6	1.5	30.1	1.9	28.7	1.4	29.4
ND 3950-4R	1.0	28.2	1.0	25.6	1.0	27.6	1.5	28.2	1.1	27.4
ND 3978-6R	1.0	29.9	1.0	30.6	3.2	31.7	2.2	31.0	1.8	30.8
ND 4173-1R	1.5	31.9	2.2	32.1	4.7	33.6	4.8	35.2	3.3	33.2
ND 4173-3R	1.4	29.4	2.3	28.3	3.1	30.7	2.8	29.0	2.4	29.3
ND 4289-5R	1.0	30.9	1.0	28.7	1.0	31.5	1.8	29.4	1.2	30.1
ND 4289-14R	1.1	29.9	1.0	27.8	1.5	30.1	1.3	29.5	1.2	29.3
ND 4289-15R	1.0	30.4	1.8	29.3	3.0	31.6	2.9	31.8	2.2	30.8
ND 4419-2R	1.5	31.4	2.8	29.8	4.9	32.9	5.1	31.2	3.6	31.3
ND 4468-1R	1.0	29.4	1.0	27.5	1.4	29.4	2.5	30.0	1.5	29.1
Average	1.1	30.4	1.4	28.8	2.4	30.7	2.7	31.2	1.9	30.3

1/ Samples were grown in 1959 and chipped during 1959-60.

2/ Color rating 1-6 (1 poor-dark, 6 good, very light brown).

3/ Percent chip yield.

North Dakota table 6. Chipping quality of potatoes grown at Williston, North Dakota, under irrigation and non-irrigation, 1959-60.

Variety or selection	Color ^{1/} Feb. 9		Color Feb. 24		Color Mar. 8		Color Mar. 22		Color Average		Yield ^{2/} Average	
	^{3/}											
	I	NI ^{4/}	I	NI	I	NI	I	NI	I	NI	I	NI
Cobbler	3.9	1.6	5.3	4.5	5.7	6.0	5.9	5.9	5.2	4.5	36.1	35.9
Kennebec	3.3	5.8	3.9	6.0	6.0	6.0	5.4	6.0	4.7	5.9	34.6	36.9
Navajo	1.1	3.7	4.1	5.9	4.3	5.6	4.6	6.0	3.5	5.3	35.0	34.7
Nordak	1.0	1.0	2.3	1.0	2.0	1.0	4.3	1.2	2.4	1.1	33.6	31.7
Norgleam	1.0	1.0	2.0	1.5	1.7	1.5	3.2	1.4	2.0	1.3	34.0	31.3
Norland	4.4	4.3	5.4	4.9	5.4	5.1	5.0	5.7	5.0	5.0	32.4	30.9
Red LaSoda	4.4	4.8	4.9	5.9	5.0	5.8	5.2	5.9	4.8	5.6	34.6	36.1
Red Pontiac	2.3	3.0	3.7	3.9	1.4	5.6	2.4	5.4	2.9	4.5	33.3	33.5
ND 3324-2	1.6	1.8	3.1	3.7	4.0	4.5	5.2	5.4	3.4	3.8	33.2	33.0
ND 3631-5R	1.4	4.5	3.9	4.6	4.0	5.9	4.4	5.7	3.4	5.1	34.9	34.6
ND 3740-11	2.4	4.3	2.3	4.0	4.0	5.2	3.3	5.6	3.0	4.8	33.3	32.8
ND 4122-2	1.0	2.3	1.8	3.2	1.0	2.9	3.2	5.2	1.7	3.4	34.6	35.1
Average	2.3	3.2	3.5	4.1	3.7	4.6	4.3	4.9	3.5	4.2	34.1	33.9

^{1/} Color rating 1-6 (1 poor-dark, 6 good, very light brown).

^{2/} Percent based on 100 pounds of potatoes.

^{3/} I = Irrigation.

^{4/} NI = non-irrigation.

North Dakota table 7. Cooking quality of varieties and selections grown at Grand Forks, 1959.^{1/}

Variety or selection	Boiling quality					Baking quality				
	(1-10)					(1-10)				
	(1-10) ^{2/} Sloughing	(1-10) Mealing	(1-10) Texture	(1-10) Color after cooking	(1-10) Color after cooking 4 hrs.	(1-10) Mealing	(1-10) Texture	(1-10) Color	(1-10) Off color	(1-10) Off flavor
Cobbler	3.5	7.7	8.0	6.7	5.0	8.7	8.7	7.7	8.7	8.7
Early Gem	6.7	2.2	6.7	6.7	6.5	2.0	6.7	6.0	5.5	Bitter
Excel	4.2	7.0	7.5	5.2	2.0	6.2	7.5	7.5	7.2	7.2
Fundy	2.2	3.7	6.0	8.5	2.5	7.5	8.7	9.7	8.0	8.0
Kennebec	7.0	4.7	7.5	3.5	3.5	4.7	7.2	7.0	6.5	6.5
Navajo	6.2	4.2	7.0	4.7	4.7	4.5	7.5	4.7	Sl. gray	6.5
Nordak	5.2	6.5	6.7	8.0	5.2	7.2	8.0	6.7	7.5	7.5
Norgleam	5.2	6.7	7.2	8.5	6.7	8.2	8.5	8.0	7.2	7.2
Norland	8.2	5.2	7.7	8.5	4.5	4.5	8.5	9.0	8.2	8.2
Red LaSoda	8.0	2.2	7.2	6.2	4.7	2.2	6.7	5.2	7.0	7.0
Red Pontiac	7.5	2.5	7.5	7.5	7.2	2.7	6.7	5.5	7.5	7.5
Red Warba	4.5	6.5	7.5	7.0	5.7	7.5	7.7	6.5	7.2	7.2
F29-1	8.0	2.5	6.7	6.0	5.0	2.2	6.5	4.5	Gray	4.7
CS 11889	4.2	4.7	6.7	5.0	1.2	5.5	7.5	6.5	6.7	6.7
Long 2.23	7.0	6.2	7.5	6.7	4.5	6.5	7.7	6.5	Sl. gray	7.2
Picha 5	5.5	8.0	7.5	5.5	4.7	5.7	7.7	6.2	6.7	Flat
Picha 15	6.5	5.7	7.5	5.5	5.7	5.2	7.7	5.2	6.5	Flat
ND 3022-18	5.5	8.0	8.0	4.5	5.2	8.5	8.2	8.7	9.0	9.0
ND 3324-2	5.7	8.0	8.2	8.0	6.2	8.5	8.2	4.5	6.0	6.0
ND 3440-2	6.0	3.0	8.2	5.0	3.2	2.7	7.0	5.0	5.2	5.2
ND 3631-5R	9.0	4.2	8.5	6.5	6.5	2.5	6.7	4.2	5.7	Bitter
ND 3631-6R	6.2	3.5	7.5	7.5	5.5	3.5	7.0	5.7	6.7	6.7
ND 3676-5	6.7	5.2	7.7	6.7	6.0	6.2	7.5	7.2	6.7	6.7
ND 3676-20	7.0	7.0	8.0	6.2	5.5	7.5	8.0	7.2	6.7	6.7
ND 3676-21	7.0	6.5	7.5	6.5	4.0	7.5	7.7	4.2	6.5	6.5
ND 3694-6	5.0	7.7	7.2	5.2	2.5	7.2	8.0	3.2	6.5	6.5
ND 3699-5R	6.0	5.2	7.5	4.7	3.7	6.2	7.2	5.0	Sl. gray	7.0

continued

North Dakota table 7, continued.

ND 3740-1	5.5	7.5	7.7	7.7	4.7	7.5	3.7	8.0	7.5	6.7	6.7
ND 3740-9	6.5	5.5	7.7	8.0	5.7	6.7	5.2	8.0	8.0	6.7	6.7
ND 3740-11	7.0	6.2	7.2	5.7	3.5	5.7	4.2	8.2	4.5	Sl. gray	7.2
ND 3815-1R	8.0	5.7	7.5	7.7	5.0	7.0	4.0	8.0	6.7	7.2	7.2
ND 3919-2	4.2	5.2	6.5	5.5	4.0	6.5	4.7	8.0	7.2	7.0	7.0
ND 3950-4R	4.0	1.2	7.5	6.2	5.5	5.7	1.0	7.7	6.2	6.0	6.0
ND 3978-6R	7.0	6.2	7.5	6.0	3.7	6.5	6.0	7.5	6.5	7.0	7.0
ND 4121-25	6.0	4.2	7.5	7.0	3.5	6.5	7.0	8.0	8.2	7.7	7.7
ND 4122-2	7.5	6.7	7.7	6.2	6.7	6.2	8.2	7.7	5.5	6.7	6.7
ND 4173-1R	6.7	5.0	8.0	7.2	5.0	7.5	7.5	7.7	6.5	7.2	7.2
ND 4173-3R	6.2	5.2	8.0	8.0	6.5	7.0	4.7	7.7	6.2	7.2	7.2
ND 4192-3	7.7	7.2	7.7	8.5	7.5	7.5	8.7	8.2	9.0	8.2	8.2
ND 4289-5R	5.7	6.0	8.0	6.7	3.2	7.5	3.7	7.7	7.0	Sl. bitter	7.0
ND 4289-14R	5.2	5.0	8.0	7.2	5.0	7.2	6.0	8.0	7.5	Bitter	7.0
ND 4289-15R	7.5	7.0	8.0	7.5	4.5	7.0	7.0	8.0	7.0	Bitter	7.5
ND 4419-2R	7.0	5.5	8.0	6.0	4.2	6.5	4.2	7.7	4.0	Gray	6.7
ND 4468-1R	7.2	7.0	8.0	8.0	4.0	6.7	4.7	8.0	7.0	7.5	7.5

1/ Grown in trial 1959 and tested for cooking quality 1960.

2/ Rating 1-10 (1 least desirable, 10 most desirable).

North Dakota table 8. Summary of selections highly resistant to scab.

Selection	Location	Parentage	Scab area	Rating type	General rating	
					Scab	Silver scurf
ND 4667-2	Park River	B 929-32 x Norgleam	T	1	4	1
"	Fargo	"	1	1	4	4+
ND 4708-8	Park River	WX 125.52 x ND 3324-2	T	1	4+	4
"	Fargo	"	1	1	4	4
ND 4943-1	Park River	ND 457-1-10-15 x B 929-32	1	1	4	4
"	Fargo	"	T	1	5	5
ND 4422-8	Park River	ND 3291-5 x WX 125.52	1	1	4	2
"	Fargo	"	T	1	5	3
ND 4423-5	Park River	ND 3291-5 x WX 137.52	T	1	5	5
"	Fargo	"	1	1	4	3
ND 4468-1R	Park River	B 2876-1 x La 1859	T	1	4	3+
"	Fargo	"	T	1	5	4

1/ General rating given as 1 poor resistance to 5 highly resistant.

North Dakota table 9. Index readings in greenhouse for virus Y for the various crosses in the virus Y parental line studies.

Cross Category	Y readings		Ratio	
	YF	YI	YF	YI
457-1	all		1	0
457-1 (S ₁)				
457-1-10 (Nordak)	all		1	0
-16 (Norgleam)	all		1	0
-35	2	6 + 1?	1	3
-36	9	1 (LR)	1	0
-77	all		1	0
-82	9	1 (LR)	1	0
457-1 (S ₂)				
457-1-10-6	9	1?		
457-1-10-24	all		1	0
Outcrosses				
with 457-1	185	64	2.89	1
457-1-10	189	39	4.84	1
457-1-16	207	49	4.22	1
457-1 hybrid	68	38	1.79	1
457-1 backcrossed to 457-1 hybrid	20	5	4.00	1
S ₁ crossed to 457-1 hybrid	45	20	2.25	1
457-1 crossed to S ₁ (457-1-10) hybrid	31	5	6.20	1
(457-1-16) "	12	3	4.00	1
S ₂ x 457-1	12	3	4.00	1
S ₂ crossed to 457-1 hybrid (3324-2)	14	3	4.67	1
457-1 hybrid x 457-1 hybrid (double cross)	42	13	3.23	1
Pontiac check - Field	11	89	1	8

YF = Free of virus Y

YI = Virus Y infected

North Dakota table 10. Ratios of populations segregating for resistance to virus Y under field and screened cage conditions.

Cross	Ratio			
	Cage		Field	
	YF	YI	YF	YI
S ₂ x P		4.5-1		5.0-1
S ₁ x P		3.0-1		6.4-1
S ₁ d P hybrid		1.9-1		2.1-1
P x P hybrid		2.0-1		2.6-1
S ₁ x Outcross		.2.6-1		4.8-1
P x Outcross		10.3-1		2.5-1
Pontiac		1-10		1-9.9

YF = Free of virus Y
 YI = Virus Y infected

OHIO (Columbiana County)

Floyd Lower

The purpose of the test is to find new varieties suitable for chipping and also for table stock which would be adapted to this area.

The seed used consisted of lots kept over from the 1959 plots, seed from Experiment Stations, and potatoes from certified seed growers. The cut seed was treated with dry captan and planted May 3 on Wooster silt loam on which alfalfa timothy sod had been plowed down. Fertilizer (8-16-16) was applied in the row at the rate of 1300 lb. per acre. Potatoes were dug on October 15. The season was generally favorable with distributed rainfall except late in the season when it was dry. No diseases of importance were present and late blight did not develop this year. Actual planting distance was 9 inches by 36 inches. The lots were not replicated, but check rows were used to determine soil differences, if any. The usual cultivation and spray schedules were followed. The potatoes were hoed twice due to a weed problem early in the season and harvested October 15.

Twenty-nine varieties were planted in 1/100 acre rows for yield records and thirty 5-lb. lots were planted from which the best varieties are to be selected for yield records next year. The 5-lb. lots of seed were weighed and have been included in the records.

Seed from the 1959 test plots was saved for 22 varieties since little disease was apparent in 1959. However, these lots were all severely infected with leaf roll. The same was true in commercial fields in the area. It was the most serious infection of leaf roll ever seen in this section.

Strangely enough little leaf roll was found in the plots in the fall of 1959. The infection was so serious that yields were greatly reduced. Consequently, yield data for these lots have been omitted in Lower table 1. The 22 lots grown from the 1959 test plot seed averaged 269 bushels per acre, whereas the 37 lots grown from new seed averaged 555.5 bushels per acre. These lots, of course, were different varieties but the figures are indicative of the results of the leaf roll infection.

Good yields were obtained due to fertile soil and ideal distribution of rainfall through most of the season. Several of the lots were also planted on two other farms in the area with comparative yields similar to that in the test plots. Huron and Kennebec led in yields on these farms.

Yields are computed on the basis of total production of field run potatoes and are not on a marketable basis. Notes were made where there was a striking difference in size and grade of tubers. In Lower table 1 the lots for which yield data is given are marked with an x when grown in the 1/100 acre rows. The other lots for which yield data is given were 5-lb. lots and are not quite as representative.

Available data on specific gravity is included and the chip color is indicated only when it was fair to poor. For this data the chips were run immediately after digging. They will be run two more times to get the necessary information for the final report. Dr. Wilbur Gould at Ohio State University, and Berg Bretzels, Inc., of Leetonia, are running the chipping tests.

Some of the other well-known varieties which chip satisfactorily were not grown since the purpose was to find new varieties suitable for the area.

Lower table 1. Potato variety test, Columbia County, Ohio, 1960.

Variety	Total Yield per acre Cwt.	Specific Gravity	Chip ^{2/} color	Variety	Total Yield per acre Cwt.	Specific Gravity	Chip color
<u>Very Early</u>				F 29	361	1.072	
Nordak	239	1.073		Norkota	294	1.083	
<u>Early</u>				N.D. 3740-11	378	1.079	P
Irish Cobbler ^{1/}	312	1.073	F	<u>Midseason</u>			
Onaway ^{1/}	353	1.073	F	No. 74	300	1.086	F
Haig	305	1.074		B 73-3	360	1.076	
N.D. 3324-2	317	1.075		Susquehannock ^{1/}	256	1.062	P
B 605-10	323	1.074		Mich. 1111-8	454	1.081	
Wisc.X137-52	286	1.079		Katahdin ^{1/}	331	1.069	
Ag. 120	338	1.081		<u>Late Midseason</u>			
Marygold	403	1.077	F	Kennebec ^{1/}	361	1.079	
<u>Medium Early</u>				Nokomis ^{1/}	278	1.073	
CS 11,889	275	1.079		Golden	283	1.066	P
Mich. 1111-5	276	1.082		Ag. 56.55	432	1.076	
Keswick	231	1.074		Mohawk	376	1.078	
<u>Early Midseason</u>				<u>Late</u>			
Redbake	317	1.073		B 751-119	322	1.081	
N.D. 4122-2	278	1.069		<u>Very Late</u>			
Wisc.X143-52	257	1.086		Huron ^{1/}	420	1.081	F
Allehanna ^{1/}	345	1.068	F	Sebago ^{1/}	386	1.074	
Pungo	445	1.079		47156	385	1.078	Y
Excel	506	1.081		46121	287	1.075	Y

^{1/} 1/100 A. plots.

^{2/} Chip color indicated only when fair to poor.

Late tests to be checked.

OHIO
J. P. Sleesman

Potato leafhopper populations were unusually high in 1960. Unsprayed plants of susceptible varieties were severely damaged by hopperburn and yields were reduced as much as 60 percent. Flea beetle populations were average. Early and late blights were not observed in any of the plots.

Materials studied for resistance to insects included 55 advanced selections, 2025 first-year seedlings representing 9 progenies, 24 species introductions, 100 foreign varieties, 53 interspecific hybrids, and 42 selections or families of *S. tuberosum* haploid x diploid species. Data were obtained on the amount of adult flea beetle feeding, leafhopper populations, and degree of hopperburn.

Three of the advanced selections were lightly populated with leafhopper nymphs and showed little hopperburn. All of them, however, were late in maturing, the yield disappointingly low, and the tubers rough and misshapened.

All of the foreign varieties were susceptible to leafhopper attack, populations ranging from 2.8 to 15.6 nymphs per leaf. About 8 percent were lightly hopperburned, 35 percent heavily damaged, and about 50 percent showed medium hopperburn injury. There was considerable variation in the amount of flea beetle feeding among the foreign varieties but none was highly resistant to this insect. Adult flea beetle feeding ranged from 10 holes per leaflet in *Akrebis* to 169 in *Aquila*.

Among the species introductions, *berthaultii*, *brachycarpum*, *bulbocastanum*, *cardiophyllum*, *chacoense*, *pinnatisectum*, and *setulosistylum* were free of leafhopper nymphs and of hopperburn. The amount of flea beetle feeding was very low for these species, averaging less than one hole per leaflet.

About 50 percent of the interspecific hybrids showed little or no hopperburn and relatively low nymphal populations. Many of them were very lightly fed upon by the adult flea beetle but there was no correlation between flea beetle feeding and leafhopper populations.

Most of the *tuberosum* haploid x diploid species selections were susceptible to both leafhopper and flea beetle attack. US-W7 x *S. chacoense* and US-W7 x *S. kirtzianum* were highly resistant to the leafhopper.

PENNSYLVANIA

J. D. Harrington, E. C. Pifer, and F. J. McArdle

In 1960 potato variety trials were conducted in Centre County, and in the five outlying counties; Schuylkill (E), Somerset (S.W.), Lehigh (E), Luzerne (N.E.), and York (S.E.).

Experimental Conditions-Centre County

For the seven-day period prior to planting and the five-day period after planting traces of precipitation and above-normal temperatures were recorded at State College, Pa. Weather conditions which prevailed from the last date of planting, April 21st, until initial harvest date, September 28, are summarized as follows:

<u>Period</u>	<u>Days</u>	<u>Temp.</u>	<u>Precipitation - Inches</u>	
		<u>Index</u>	<u>Total</u>	<u>7-Day Ave.</u>
April 21 - May 15	24	Above normal	5.42	1.58
May 16 - July 15	61	Below normal	9.00	1.03
July 16 - Sept. 1	48	Below normal	1.76	.26
Sept. 2 - Sept. 28	27	Above normal	5.09	1.32
Total	160		21.27	

Varietal trials were conducted at the Department of Agronomy Crops and Soils Experimental Farm, 12 miles southeast of State College, Pa., on a Hagerstown silt loam soil derived from dolomitic limestone with a silty clay subsoil and characterized with good internal drainage. A fall-plowed alfalfa-orchardgrass sod preceded potatoes in the PWH rotation. At the experimental site and prior to planting, rows 3 feet apart were furrowed while simultaneously banding in the row 2000 pounds per acre of 5-10-10 fertilizer.

A completely randomized design with five replications was employed for each of the three potato maturity groups. Seedpieces of potato seedlings and varieties were hand-planted 9" apart within each 30-foot row plot on April 20th and 21st. Initial tuber digging began September 28th and was completed on October 11th. Plot weights and grading percentages, average U. S. No. 1's for five replications, were recorded soon after digging. During the grading process, two U. S. No. 1 size samples were saved from each variety for specific gravity and chipping quality determinations.

Experimental Conditions-Outlying counties

Variety trials were conducted in five outlying counties with varying ecological influences under the auspices of extension specialists^{1/} in conjunction with Agricultural County Agents and cooperating reliable potato growers.

All experiments were designed as randomized blocks with four replications. Specific fertilizer applications at each location were employed on the basis of soil test results. Planting dates were initiated as soon as possible in the spring depending upon weather conditions. Seedpieces of each variety were hand-planted in 30-foot row plots 9 inches apart within the row and with a distance of 34 inches between the row. Seedpieces of Red Pontiac were planted

^{1/} Extension Representatives of Agronomy, Agricultural Economics, Entomology and Plant Pathology.

in 5-foot breaks between plots to avoid varietal mixing at digging. Final plot yields were recorded at harvest, and tubers were graded immediately according to U. S. No. 1 Marketable grades. Composite varietal samples of four replications at each location were saved for specific gravity and chipping quality determinations, which were performed within 72 hours after being brought in from the field.

Chipping Quality Evaluation-All Counties

Specific gravity readings were converted to total solids by means of Maercker's table. Chipping indices were determined soon after harvest at all locations, and also, in Centre County after 10 weeks in storage at approximately 40°F. followed by a two-week reconditioning period at 70°F. Duplicate one-pound samples of peeled potatoes was employed in determining chip yield. Chip color was evaluated with a Gardner Color and Color Difference Meter. Gardner Rd or reflectance values were determined in comparison with color standard #C-LY-1047-57 obtained from Gardner Laboratory, Inc. Samples with Rd values of 19.0 or greater were considered to be in the range of acceptability.

Experimental Results-Centre County

Twenty-nine early, 12 medium, and 12 late maturing varieties were compared for yielding ability and total solids content in Centre County (Central) Pennsylvania in 1960, Pennsylvania table 1. Also, at this location the chipping quality of 28 early, 8 medium, and 12 late maturing varieties was evaluated after harvest, and 10 weeks after storage and reconditioning, Pennsylvania table 2.

Weather conditions during the growing season accounted for favorable plant growth and tuber development. A well-distributed average weekly rainfall greater than 1.00 inch, and cool temperatures during the initial 85 days of plant growth favored aerial vegetative growth, tuber set and initial fill. During the ensuing 48-day period, from July 16 until September 1, consistently lower temperatures than normal and average weekly rainfall of 0.26 inches was adequate for subsequent tuber-fill of initial tuber set and lower disease incidence. Although yields were low, such environmental influences do offer an explanation as to the consistently higher total solids content and very favorable chipping characteristics of all seedlings and varieties under test in 1960.

All seedling numbers in both the early and late maturity group produced significantly lower tuber yields as compared with the highest yielding varieties in their respective maturity group; namely, Pungo, medium-early, and the three late maturing varieties, Red Pontiac, Smooth Rural and Rukat. However, the yields of early maturing seedlings F 4613, B 605-10, X 1276-185 and B 73-3 were not significantly different than the yields obtained with the Cobbler variety. Total solids content of these seedlings compared favorably with Cobbler. Of all varieties and seedlings included in the early maturity group B 73-3 showed the highest total solids, 24.0 percent, whereas B 137-3 and Early Gem possessed the lowest percent dry matter, 18.3 percent.

Kennebec, Redskin (B 2368-4) and Delus, midseason to medium-late maturity varieties, produced significantly greater tuber yields than Katahdin. Redskin produced the highest yield of total solids per acre and Blanca the lowest.

Late-maturing seedlings B 3352-8 and B 3819-17 were significantly lower in tuber yield and total solids than Russet Rural. However, both seedlings were superior to Sebago and Merrimack in yielding ability and total solids produced on an acre basis. Whereas, Smooth Rural and Russet Rural showed the highest dry matter content, Red Pontiac and Sebago exhibited the lowest.

Of varieties and seedlings included in the 1960 variety trials the six varieties; Red Pontiac, Smooth Rural, Rukat, Kennebec, Redskin and Pungo produced more than 500 bushels (cwt./A multiplied by 1.666) of U. S. No. 1 potatoes per acre. Selections B 4159-2, B 4094-21, B 3428-20, B 3726-6, Blanca and Merrimack produced less than 258 bushels per acre. Delus, Smooth Rural, Russet Rural and B 73-3 showed the highest percent dry matter, 25.2, 24.8, 24.3 and 24.0, respectively. On the other hand, lowest percent total solids was demonstrated by Norland, 18.3, Early Gem, 18.3 and Red Pontiac, 18.9.

Tuber yields produced by Cobbler and Katahdin from Maine-grown, pre-cut seed as compared with Maine-grown, freshly-cut seed prior to planting were lower, although the differences were statistically non-significant. Additionally, different seed sources of the same variety when compared in 1960 resulted in significantly lower tuber yields. For example, Maine-grown Katahdin seed produced 264 cwts. per acre as compared with Pennsylvania-grown Katahdin seed which yielded 218 cwts. per acre. Similarly, 271 cwts. per acre were obtained from the Plymouth variety when the seed was produced in Maine as compared with tuber yields of 233 cwts. per acre when the seed was grown in New York.

In most instances, all seedlings and varieties chipped satisfactorily after harvest and after ten weeks in storage followed by a reconditioning period. Varieties of outstanding quality for chipping were Delus, Katahdin, Merrimack, Russet Rural, Smooth Rural, B 73-3, B 3352-8 and B 3424-11. These varieties had a dry matter content of 23-25 percent, gave a high yield of good color chips, held up well in storage and produced high quality chips after the two-week conditioning period. Other varieties which conditioned very well after storage were; Plymouth, Rushmore, and Kennebec. Selection B 3726-6 chipped well after harvest but less favorably after storage.

Experimental Results-Outlying Counties

In outlying-county yield performance variety trials, Penna. table 3, tuber yields varied depending upon local weather conditions; weather conditions being least favorable in Somerset County and most favorable for potato production in Schuylkill County during 1960. Highest total solids content was recorded in Somerset County and lowest in York County. For all counties combined, Pungo, Cobbler and Avon, early-maturing varieties; Katahdin, and Sebago, medium- and late-maturing varieties respectively, produced the highest marketable tuber yields.

In the three counties in which the performance of the Alleghanna variety was evaluated this variety produced considerably lower tuber yields, showed a lower total solids content, with the exception of Cobbler in Somerset County, difference 0.4 percent, than any of the recommended potato varieties in Pennsylvania. For comparative purposes these recommended varieties include

Pungo, Cobbler, Katahdin, Kennebec, Sebago and Russet Rural. In conclusion, with few exceptions, Alleghanna produced the lowest marketable tuber yields, possessed the lowest total solids content as compared with all varieties under experimentation at three locations in 1960.

In chipping quality tests, Penna. table 4, the nine different maturing varieties did not vary significantly in dry matter content or chip yield. Avon, Russet Rural and Sebago varieties produced chips with significantly better color. Chips produced from the Cobbler and Fundy varieties exhibited a significantly poorer color characteristic. Varieties grown in Somerset County had significantly higher dry matter content.

Pennsylvania table 1. Tuber yields and total solids content of potato seedlings and varieties in Centre County, Pennsylvania, 1960.

Variety or Seedling	Seed Source	U. S. No. 1 Yields per acre			
		Solids			
		Cwt.	Pct.	Pct.	Cwt.
Early to medium-early maturity					
Pungo	USDA	331	92	21.4	71
Onaway	USDA	288	94	19.6	56
Bliss	Minn.	279	90	20.0	56
Cobbler	Maine	279	87	21.5	60
Tawa	USDA	265	93	22.1	59
F 4613	USDA	262	92	20.8	54
B 605-10	USDA	254	90	21.9	56
X 1276-185	USDA	253	89	21.2	54
Avon	CaDA	252	93	21.6	54
Cobbler, Precut	Maine	252	87	21.7	55
Cherokee	Maine	249	86	20.6	51
B 73-3	USDA	247	92	24.0	59
F 5025	USDA	242	86	22.1	53
Dazoc	Nebr.	238	81	19.6	47
Fundy	CaDA	225	91	21.7	49
ND 3324-2	N.D.	221	92	19.3	43
Norgleam	N. D.	217	89	18.6	40
Norland	N.D.	214	84	18.6	40
B 137-5	USDA	213	87	18.3	39
B 4160-1	USDA	204	87	20.7	42
B 3725-1	USDA	203	89	19.8	40
Rushmore	USDA	192	90	21.5	41
Early Gem	USDA	190	91	18.3	35
Nordak	N.D.	186	91	20.7	39
B 3427-7	USDA	172	74	19.4	33
B 4159-2	USDA	146	69	21.6	32
B 4094-21	USDA	138	83	19.9	27
B 3428-20	USDA	132	82	20.2	27
B 3726-6	USDA	109	60	23.3	25
L.S.D. .05		36			

continued

Pennsylvania table 1, continued.

Midseason to medium-late maturity

Kennebec	Maine	335	95	22.2	74
Redskin	USDA	334	96	23.2	77
Delus	USDA	296	96	25.2	75
Plymouth	USDA	271	92	21.9	59
Katahdin	USDA	264	92	23.0	61
Katahdin, Precut	Maine	247	90	20.6	51
Plymouth	N. Y.	233	86	23.3	54
Chippewa	Maine	227	85	19.2	44
Katahdin	Pennsylvania	218	86	22.7	49
Navajo	USDA	217	91	22.8	49
Navajo	Colo.	203	83	22.6	46
Blanca	Colo.	160	80	22.0	35
L.S.D. .05		30			

Late maturity

Red Pontiac	Minnesota	388	96	18.9	73
Smooth Rural	N. Y.	350	95	24.8	87
Rukat	USDA	335	96	22.3	75
Russet Rural	Maine	320	94	24.3	78
B 3424-11	USDA	278	89	22.7	63
Huron	N. Y.	274	85	21.9	60
B 3352-8	USDA	272	90	23.4	64
B 3819-17	USDA	271	88	22.6	61
Ontario	USDA	265	87	22.4	59
Russet Sebago	Maine	239	87	21.8	52
Sebago	Pennsylvania	195	84	19.3	38
Merrimack	N. Y.	155	74	23.2	36
L.S.D. .05		43			

Pennsylvania table 2. Chipping quality of different maturing potato varieties and seedlings after harvest and after storage and reconditioning in Centre County, 1960.

Variety or Seedling	Mat.	After Harvest			After Storage and Conditioning		
		Solids Pct.	Chip Yield lbs./100 lbs.	Color Rd	Solids Pct.	Chip Yield lbs./100 lbs.	Color Rd
B 73-3	E	24.0	35.5	22.2	23.6	32.2	24.9
B 137-5	E	18.3	27.3	22.2	19.7	28.6	20.6
B 605-10	E	21.9	30.3	26.2	20.8	26.4	22.7
B 3427-7	E	19.4	28.6	26.6	19.8	30.7	23.5
B 3428-20	E	20.2	28.2	31.6	19.4	26.4	19.9
B 3725-1	E	19.8	27.3	27.7	21.1	29.1	27.6
B 3726-6	E	23.3	31.3	33.7	19.8	26.4	25.6
B 4094-21	E	19.9	29.5	33.7	19.4	30.4	26.7
B 4159-2	E	21.6	28.6	32.9	22.9	28.6	25.2
B 4160-1	E	20.7	30.4	34.0	19.9	30.0	19.0
B 4613	E	20.8	27.8	32.5	19.8	28.6	24.4
F 5025	E	22.1	30.4	26.9	22.9	33.0	27.7

continued

Pennsylvania table 2, continued.

ND 3324-2	E	19.3	27.3	26.6	20.4	32.2	26.7
X 1276-185	E	21.2	29.1	32.2	19.4	28.2	25.0
Avon	E	21.6	29.1	27.2	23.5	32.7	27.7
Bliss	E	20.0	29.1	23.4	20.2	28.2	15.2
Cherokee	E	20.6	28.6	24.4	23.2	30.8	25.0
Cobbler	E	21.5	30.0	26.8	21.1	28.2	24.9
Dazoc	E	19.6	26.0	28.1	19.0	28.2	23.2
Early Gem	E	18.3	26.9	25.4	19.2	27.3	19.2
Fundy	E	21.7	30.0	26.6	20.9	27.8	26.2
Nordak	E	20.7	28.6	25.7	19.8	27.8	19.5
Norgleam	E	18.6	28.6	29.8	17.9	27.8	19.5
Norland	E	18.6	26.6	24.4	19.0	26.9	23.2
Onaway	E	19.6	29.5	18.9	20.1	28.6	24.0
Pungo	E	21.4	31.7	24.9	20.1	30.0	22.8
Rushmore	E	21.5	32.6	30.2	20.8	31.3	31.7
Tawa	E	22.1	29.5	23.4	21.8	29.1	25.0
Blanca	M	22.0	32.2	24.5	22.4	31.7	27.8
Chippewa	M	19.2	26.9	33.4	19.4	26.9	25.2
Delus	M	25.2	36.6	27.7	24.3	34.6	27.9
Katahdin	M	23.0	34.6	27.8	22.6	34.4	30.2
Kennebec	M	22.2	29.5	29.0	23.6	33.5	34.0
Navajo	M	22.8	31.3	27.7	23.6	34.4	26.9
Plymouth	M	21.9	28.6	32.7	21.9	30.6	33.2
Redskin	M	23.2	32.2	27.2	21.3	28.6	26.6
B 3352-8	L	23.4	31.7	31.1	24.1	35.2	31.0
B 3424-11	L	22.7	30.4	28.2	24.0	34.4	30.9
B 3819-17	L	22.6	31.7	29.2	22.0	31.7	21.0
Huron	L	21.9	30.0	23.9	22.8	30.8	24.9
Merrimack	L	23.2	31.7	25.2	23.1	33.0	30.7
Ontario	L	22.4	31.7	29.7	22.1	33.5	28.2
Red Pontiac	L	18.9	29.1	20.9	19.7	29.5	20.0
Rukat	L	22.3	31.3	30.2	21.4	28.2	29.2
Russet Rural	L	24.3	35.7	27.7	24.2	35.0	31.0
Russet Sebago	L	21.8	29.1	28.9	21.2	32.6	29.2
Sebago	L	19.3	28.6	26.9	19.9	29.1	22.2
Smooth Rural	L	24.8	35.5	32.2	23.4	34.3	28.0

Pennsylvania table 3. Yields and percent solids of potato varieties in five-outlying Pennsylvania counties, 1960^{1/}

Variety	Mat.	Lehigh			Luzerne			Schuylkill		
		U.S. No. 1, Yield/A			U.S. No. 1, Yield/A			U.S. No. 1, Yld./A		
		Solids			Solids			Solids		
		Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.
Pungo	M-E	77	268	19.2	61	147	19.3	80	441	17.3
Cobbler	E	93	296	18.9	61	164	18.7	87	400	17.6
Avon	E	83	250	19.0	67	172	20.0	86	373	16.2
Fundy	M-E	90	204	18.3	65	163	18.4	76	261	17.3

continued

Pennsylvania table 3, continued.

Katahdin	Mid.	87	367	17.6	71	232	18.8	86	535	17.2
Kennebec	Mid.	84	328	17.9	55	176	19.2	71	538	17.0
Sebago	L	87	323	16.9	69	202	18.2	81	537	15.9
Russet Rural	L	81	317	19.3	61	170	19.4	73	489	17.4
Huron	L	81	339	19.9	48	164	19.6	79	553	18.5
Allehanna	E	80	210	16.7	-	-	-	-	-	-
Navajo	M-E	82	210	18.8	-	-	-	85	310	14.6
Blanca	Mid.	82	233	18.6	-	-	-	84	353	17.6

Variety	Mat.	Somerset			York			AVERAGE		
		U.S. No.1, Yld./A			U.S. No.1, Yld./A			U.S. No.1, Yld./A		
		Solids			Solids			Solids		
		Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.	Pct.	Cwt.	Pct.
Pungo	M-E	78	98	20.8	69	290	15.8	73	249	18.5
Cobbler	E	73	137	19.5	77	239	16.6	78	247	18.3
Avon	E	96	168	21.8	79	250	16.2	82	243	18.6
Fundy	M-E	70	107	20.3	87	245	16.6	78	196	18.2
Katahdin	Mid.	76	144	21.8	87	299	14.2	81	315	17.9
Kennebec	Mid.	62	143	21.1	77	258	16.0	70	289	18.2
Sebago	L	77	146	23.2	88	355	15.3	80	313	17.9
Russet Rural	L	87	159	22.2	75	247	18.1	75	278	19.3
Huron	L	59	114	21.2	52	148	16.2	64	264	19.1
Allehanna	E	62	61	19.9	61	200	14.0	68	157	16.9
Navajo	M-E	-	-	20.5	-	-	-	84	260	18.0
Blanca	Mid.	-	-	-	-	-	-	83	293	18.1

1/ Trials conducted by the Extension sections of Agronomy, Agricultural Economics, Entomology and Plant Pathology in cooperation with the Agronomy Staff of the Agricultural Experiment Station.

Pennsylvania table 4. Chipping quality of potato varieties after harvest in five counties, 1960.

Variety	Mat.	Lehigh			Luzerne		
		Solids	Chip Yld.	Color	Solids	Chip Yld.	Color
		Pct.	lbs./100 lbs.	Rd	Pct.	lbs/100 lbs	Rd
Avon	E	19.0	31.5	33.2	20.0	31.0	25.6
Cobbler	E	18.9	35.0	27.2	18.7	31.5	19.2
Fundy	M-E	18.3	31.0	25.0	18.4	31.4	24.7
Huron	L	19.9	34.0	25.2	19.6	33.4	19.7
Katahdin	M	17.6	34.0	27.0	18.8	32.5	24.9
Kennebec	M	17.9	32.0	25.2	19.2	34.0	25.7
Pungo	M-E	19.2	33.5	27.0	19.3	32.5	22.4
Russet Rural	L	19.3	36.5	27.2	19.4	34.0	30.5
Sebago	L	16.9	34.0	27.9	18.2	33.8	24.5
Average		18.6	33.5	27.2	19.1	32.7	24.1

continued

Pennsylvania table 4, continued.

		Lehigh			Luzerne		
		Solids	Chip Yld.	Color	Solids	Chip Yld.	Color
		Pct.	lbs./100 lbs.	Rd.	Pct.	lbs./100 lbs.	Rd.
Avon	E	16.2	30.0	34.2	21.8	32.2	34.4
Cobbler	E	17.6	32.5	26.7	19.5	30.0	27.0
Fundy	M-E	17.3	30.0	24.4	20.3	33.2	25.7
Huron	L	18.5	33.7	25.7	21.2	31.0	32.1
Katahdin	M	17.2	30.4	26.8	21.8	31.7	26.3
Kennebec	M	17.0	33.8	25.5	21.2	31.4	23.4
Pungo	M-E	17.3	30.2	25.5	20.8	31.7	26.9
Russet Rural	L	17.4	32.2	31.2	22.2	34.0	26.7
Sebago	L	15.9	33.5	26.6	23.2	34.2	31.5
Average		17.2	31.8	27.4	21.4	32.2	28.2
		York			AVERAGE		
		Solids	Chip Yld.	Color	Solids	Chip Yld.	Color
		Pct.	lbs./100 lbs.	Rd.	Pct.	lbs./100 lbs.	Rd.
Avon	E	16.2	29.0	24.4	18.6	30.7	30.4
Cobbler	E	16.6	29.8	24.4	18.3	31.8	24.9
Fundy	M-E	16.6	29.8	24.9	18.2	31.1	24.9
Huron	L	16.2	30.0	22.2	19.1	32.4	25.0
Katahdin	M	14.2	28.8	25.2	17.9	31.5	26.0
Kennebec	M	16.0	30.1	25.9	18.2	32.3	25.1
Pungo	M-E	15.8	29.9	23.9	18.5	31.6	25.1
Russet Rural	L	18.1	36.5	25.4	19.3	34.6	28.2
Sebago	L	15.3	32.8	27.7	17.9	33.7	27.6
Average		16.1	30.7	24.9	18.5	32.2	26.4
LSD .01 (Counties)		2.0	NS	NS			
LSD .01 (Varieties)					NS	NS	1.2

PENNSYLVANIA

W. R. Mills

Work in 1960 was a continuation of the potato breeding program described in previous reports. Special emphasis is placed on late blight resistance and chipping quality. As frequently happens, the latter part of the season was extremely dry at University Park, where the major part of the breeding work is done. Rainfall records for the last 6 weeks of July and August are as follows:

July 16-31: 0.62 inches, August 1-15: 0.77 inches, and
August 16-31: 0.15 inches.

Under those conditions, no blight developed in the plots and the varieties were dead or nearly so by early September.

A spray experiment, comparing 9 fungicidal treatments to a check receiving only an insecticide, yielded no significant differences, although the largest number of pounds of potatoes was produced by the plot receiving only the insecticide. Yields for the treatments, variety Katahdin used, varied from 313 to 349 bushels per acre.

In Potter County, a northern, high-elevation seed area, where seed and increase plots are maintained, rainfall was adequate in July, but very dry in August and early September. Again, no blight was present in Potter County. This is in contrast to the southeastern part of the State, where rainfall was excessive throughout the year and blight was very damaging.

All seedlings are tested for blight-resistance. The first inoculation is made, with a mixture of races, in the seedling flats to eliminate all seedlings carrying less than two major genes for blight resistance. All seedlings saved at harvest are tested again to determine to which race or races they are susceptible, and the degree of susceptibility to compatible races.

For the past several years, all new seedlings have been tested for chipping quality. Crosses are made between seedlings and varieties known to possess good chipping quality. As a result of this selection of parents, a large proportion of the progeny make good chips. Of the new selections grown in 1960, 75 percent of them made better chips than Katahdin. Several of our older seedlings have been tested for three or more years and their high chipping quality is established. A severe setback was encountered in 1959, a year of unprecedented heat and drought, when an unusually high spread of virus diseases occurred, resulting in the loss of much of the seed supply. We believe that the seed stocks were cleaned up in 1960 and plan to increase them in 1961.

FW - 450. In 1959 and 1960, field experiments were conducted with a selective gametocide, FW-450 manufactured by Rohm and Haas. The object was to prevent berry formation on the self-fertile variety Katahdin and to measure the effect, if any, on yield. Earlier work at Minnesota indicated that the setting of fruit tended to reduce tuber yield.

In 1959, experiments were conducted at University Park and in Potter County, in 1960, at University Park only. Because of heat and dry weather, fruit set was low at both locations. In 1959 at University Park, one, two and three applications at two pounds per 100 gallons were made; also three applications at one, two and four pounds per 100 gallons.

There was obvious plant damage at the higher rates of application, with yield reduction. Unsprayed plants set an average of 22 berries per 10 plants, one application of two pounds per 100 gallon reduced berry production to 1.3 berries per 10 plants with complete berry suppression at the other rates. There were no yield differences between plants with flowers cut off, untreated plants and those sprayed once with two pounds per 100 gallons.

In Potter County, double rows of 50 feet, sprayed with one application at the rate of two pounds per 100 gallons and replicated 5 times produced 9 berries per 10 plants as compared to 50 per 10 plants for untreated. Yields for the two plots were almost identical. Under normal conditions, berry production would have been many times greater in untreated Katahdin potatoes.

In 1960, experiments were conducted at University Park only. Treatments consisted of cut flowers, untreated, and 1 and 2 applications at the rates of one, one and a half and two pounds per acre. Berry set throughout the field were so low that detailed counts were not made. No yield differences were noted.

The possibility of a residual effect on pollen production by plants originating from tubers of sprayed plants was investigated. Tubers from each of the University Park treatments of 1959 were planted in the greenhouse in 1960 and flowers were self-pollinated. All set seed equally well, indicating no carry-over effect.

A difficulty encountered in conducting a small scale experiment of this type is the inability to exclude pollen from unsprayed plots. The few berries found in the sprayed rows in Potter County may have resulted from stray pollen. In an adjacent variety trial plot, berries, with seeds, were noted on the variety Russet Rural. Since this variety is completely pollen sterile, berries must have resulted from fertilization with foreign pollen.

Although the economic feasibility of seed control was not demonstrated, it does appear that one or possibly two applications of FW-450, at the rate of one or two pounds per acre, would eliminate berry formation in a pollen-fertile variety.

RHODE ISLAND
J. E. Sheehan

Potato yield trials consisting of 28 varieties were conducted at the Rhode Island Agricultural Experiment Station at Kingston, in 1960. Seed stock of all varieties was obtained from USDA sources at Presque Isle, Maine. The potatoes followed two years of alfalfa and trefoil on Bridgehampton silt loam.

Yields were calculated on the basis of 32-foot rows. Seedpieces were spaced 12-inches apart in the row with 36-inch spacing between rows. Each variety was replicated four times. Fertilizer consisted of 2,000 pounds per acre of an 8-12-12-2 grade applied in bands at planting.

All varieties were planted on April 18 and harvested September 26. The plants were allowed to mature naturally, no vine killers were used. Two varieties, Ontario and Sebago, were still growing when hurricane Donna struck on September 12.

The 1960 growing season was fairly normal in temperature and rainfall. The temperature was generally above normal in April, May, and June and moderately below normal in July, August, and September. Rainfall was fairly evenly distributed being slightly above normal for the growing period.

Higher than normal spring temperatures coupled with lower than average temperatures in July, August, and September helped produce exceptional yields and quality. The overall average yield was equal to last year while the average total solids content was 1.25% greater than last year.

Rhode Island Table 1 gives yield and other data for the 28 varieties grown. Highest yielding variety was Pontiac producing 493 hundredweight per acre followed by Mohawk 458, Menominee 439, Kennebec 438, Chippewa 431 and Ontario 428 hundredweight respectively. Green Mountain had the highest dry matter content 21.2% followed by Mohawk 20.8%, Saco 20.5%, Russet Burbank and Merrimack 20.1%, respectively.

Ten insecticidal sprays were applied throughout the season to control various insect pests. Flea beetle populations were moderate and satisfactorily controlled by Thiodan at one quart in 100 to 150 gallons of water per acre. The Colorado beetle and green peach aphid were more numerous than usual but readily controlled with the same material used for flea beetle control. The three lined potato beetle, which has become a major pest in this area in the last few years was controlled by Sevin at two pounds per acre. Neither Dieldrin nor Thiodan satisfactorily controlled this insect.

Eight fungicidal sprays were applied for blight control. Maneb was used except for one application late in the season when a 4-4-100 Bordeaux mix was applied at 150 gallons per acre. Although late blight was active in the vicinity, no infestation was observed among the varieties tested.

Rhode Island table 1. Yield and other data for 28 potato varieties grown at Kingston, Rhode Island, 1960.

Variety	Yield per acre		Total Solids	Days to Maturity	Tuber Size	Skin and Shape
	U. S. No. 1					
	Cwt.	Pct.	Pct.			
Pontiac	493	99.1	16.7	141	Large	Rough, sl. irreg.
Mohawk	458	99.7	20.8	144	V. Large	Rough, reg.
Menominee	439	99.3	19.5	143	Large	Rough, reg.
Kennebec	438	99.5	18.0	141	M. Large	Smooth, reg.
Chippewa	431	97.3	17.5	137	M. Large	Smooth, reg.
Ontario	428	98.0	19.7	150	Medium	Smooth, reg.
Boone	416	99.2	18.4	140	Large	Rough, reg.
Green Mountain	409	99.3	21.2	143	Large	Rough, reg.
Huron	400	99.0	18.8	141	M. Large	Rough, sl. irreg.
Saco	391	97.9	20.5	127	Large	Smooth, irreg.
Sebago	383	98.8	17.5	150	Large	Smooth, reg.
Redskin	379	99.4	19.3	123	Large	Smooth, irreg.
B 2894-24	371	99.2	17.5	125	M. Large	Smooth, reg.
Katahdin	361	98.8	18.2	127	M. Large	Smooth, reg.
Plymouth	356	99.7	17.8	121	Large	Rough, reg.
Russet Rural	353	99.3	19.5	143	M. Large	Rough, reg.
Russet Burbank	346	97.6	20.1	143	M. Large	Rough, sl. irreg.
B 2368-13	334	98.6	19.9	130	M. Large	Rough, reg.
B 2874-4	319	97.9	18.4	123	M. Large	Smooth, sl. irreg.
Cherokee	317	99.0	19.0	123	Large	Smooth, irreg.
Irish Cobbler	305	97.5	19.0	120	Medium	Smooth, sl. irreg.
B 3453-2	266	98.0	18.4	115	M. Large	Rough, reg.
Early Gem	253	99.2	17.1	115	Medium	Rough, irreg.
Delus	249	99.4	18.4	125	Large	Rough, sl. irreg.
Merrimack	232	99.3	20.1	141	Medium	Rough, reg.
Warba	208	97.5	17.8	103	M. Small	Smooth, irreg.
Tawa	203	98.4	17.8	122	Medium	Rough, irreg.
B 3428-31	200	96.7	18.4	115	Small	Rough, reg.
L.S.D. 5%	72		0.7			

SOUTH CAROLINA

W. R. Sitterly

Purpose: To determine the performance of selected varieties under coastal South Carolina environmental conditions.

I. Replicated trial

Procedure: Field F-1 was fertilized with 1000 pounds per acre of 10-10-10 on January 29. Seed pieces were planted February 11. Individual plots were 36' 4" with a 3' 8" alley, and the test contained five replicates. All plots received 30 pounds nitrogen per acre as a sidedressing, plus two foliar sprays of urea and magnesium. Fungicides and insecticides were applied as required.

Notes: Neither plant diseases nor insects were a limiting factor in production. Although 2 inches of rain fell the second day after planting, the lack of rain during the tuber sizing period of plant development required the use of irrigation. Day temperatures during this period were above 90°F. Potatoes were harvested on June 6.

Results: As shown in Table 1, the best appearing entries were Sebago, B 73-3, Nordak, and B 3602-4. B 3602-4 is too late for our area, and Sebago was too low in percent dry matter. B 73-3 was significantly higher in percent dry matter than Nordak at the 1% level and produced a little heavier, thus it was considered the best entry in the replicated trial. B 73-3 also produced a better chip color.

Pungo produced the highest yield, and this, plus a fairly high dry matter content, may tend to offset its poor appearance. B 3428-20 had the lowest yield and appeared susceptible to high temperature.

B 73-3 had the highest dry matter content; while B 2894-24 had the lowest.

Catoosa appeared to be the best red potato in this trial.

None of the entries in the replicated trial had any internal defects, but Bliss, B 3428-20, B 3391-2, B 2894-24, and Navajo failed to produce tuber size. All these were medium late to late varieties except for Bliss and B 3428-20.

Of the better varieties, Nordak shipped the best, followed by Navajo.

Conclusions: The best entry in the trial was B 73-3, followed closely by Nordak. The highest yield was produced by Pungo, and the highest dry matter content by B 73-3. The best shipping variety was Nordak, and the best chipping variety was Navajo.

South Carolina table 1. Characteristics of entries in the replicated potato variety trial. Charleston, South Carolina, 1960.^{1/}

Variety	Total Solids Pct.	Marketable Yield /Acre Cwt.	Maturity	Color	Appearance	Chip Color
Bliss	15.8	184	E	R	Poor	
Cobbler	18.2	200	E	W	Poor	
Sebago (9" spacing) ^{2/}	15.8	224	M	W	Good	5
Sebago (12" spacing) ^{2/}	15.6	180	M	W	Good	5
B 73-3 (9" spacing) ^{2/}	18.4	212	M	W	Good	3
B 73-3 (12" spacing) ^{2/}	18.5	220	M	W	Good	3
Catoosa	15.1	201	ME-M	R	Fair	
Pungo	17.2	256	ME	W	Poor	6
Nordak	16.3	188	ME	W	Good	5
B 3428-20	16.9	96	ME	W	Fair	3
B 2368-4 (Redskin)	16.8	244	M	R	Poor	
B 3391-2	17.0	200	ML	W	Fair	
B 2894-24	14.9	160	ML-L	W	Poor	
B 3602-4	16.3	184	L	W	Good	6
B 3677-1	15.3	236	M-ML	W	Poor	6
Navajo	16.7	164	ML	W	Fair	2
F 4613	16.0	164	ME-M	W	Fair	
B 3299-13	16.6	180	M	W	Poor	
LSD 5%	1.4	86				
LSD 1%	1.8	110				

^{1/} The best red potato in the trial was Catoosa.

^{2/} There was no significant difference between a 9" and 12" spacing of seedpieces for either Sebago or B 73-3.

II. Observational trial

Procedure: Same as for the replicated trial, except only a single plot was utilized. Total solids content was ascertained only for the most promising entries.

South Carolina table 2. Characteristics of the varieties in the observational potato trial.

Variety	Maturity	Color	Appearance	Total Solids Pct.	Internal Defects
B 3140-36	E	W	Poor		
Rushmore	M	R	Poor		
Kasota	M	W	Poor		
B 2187-25	ME	W	Fair		
B 3696-13	ME-M	W	Good		65% blossom-end browning
B 595-76	ML	W	Poor		
B 3604-19	M	R	Poor		50% stem-end browning
B 3454-14	ML-L	W	Poor		

continued

SOUTH DAKOTA
Kenneth D. Fisher

Sixty-three potato lines were tested under South Dakota growing conditions at two locations in 1960. Seed stock of USDA selections was obtained from Presque Isle, Maine, in 1958 and 1959; seed stock of the Louisiana lines was obtained from the Louisiana Experiment Station, Baton Rouge, Louisiana.

Observation Plots. Preliminary screening was carried out on scab-infested soil at Brookings. Each of the 40 selections was grown in 5-10 hill plots replicated twice depending on the amount of available seed. Seed pieces were spaced at 12 inches in rows 42 inches apart. Seed was planted June 2 and harvested October 17-18. Di-syston (5% active, 60 lbs/acre) was applied after emergence. No other insecticides or fungicides were applied during the growing season.

Data collected from this observation plot are given in South Dakota table 1. No late blight was observed and only trace amounts of early blight were noted.

Yield Trials. Yield performance and scab reaction of advanced lines were studied at Brookings and Watertown. Plots at Brookings were on scab infested land on which potatoes had been grown for six years. Plots at Watertown were on land which had not been used for potato production in recent years. Four USDA selections were grown only at Brookings due to insufficient quantities of seed. Descriptions of the experimental plots are as follows:

Brookings: Planted, June 2; harvested October 1 (121 days); experimental design, randomized block with four replications; rows, 50 feet long, 3½ feet apart; seed piece spacing, 12 inches; fertilizer, manure (8 tons/acre); insecticide, post-emergence sidedress with Di-syston (5% active, 60 lbs/acre).

Watertown: Planted, June 3; harvested September 29 (118 days); experimental design, randomized block with four replications; rows, 50 feet long, 3½ feet apart; seed piece spacing, 12 inches; fertilizer, 6-4-0 (one-half ton/acre); insecticides, none.

Yield and scab data are given in South Dakota table 2. Yields at Brookings were generally superior to those from Watertown. Yields of B 2368-4 (Redskin) were superior at both locations, however, quality was somewhat impaired by late maturity.

SOUTH DAKOTA
Kenneth D. Fisher

Sixty-three potato lines were tested under South Dakota growing conditions at two locations in 1960. Seed stock of USDA selections was obtained from Presque Isle, Maine, in 1958 and 1959; seed stock of the Louisiana lines was obtained from the Louisiana Experiment Station, Baton Rouge, Louisiana.

Observation Plots. Preliminary screening was carried out on scab-infested soil at Brookings. Each of the 40 selections was grown in 5-10 hill plots replicated twice depending on the amount of available seed. Seed pieces were spaced at 12 inches in rows 42 inches apart. Seed was planted June 2 and harvested October 17-18. Di-syston (5% active, 60 lbs/acre) was applied after emergence. No other insecticides or fungicides were applied during the growing season.

Data collected from this observation plot are given in South Dakota table 1. No late blight was observed and only trace amounts of early blight were noted.

Yield Trials. Yield performance and scab reaction of advanced lines were studied at Brookings and Watertown. Plots at Brookings were on scab infested land on which potatoes had been grown for six years. Plots at Watertown were on land which had not been used for potato production in recent years. Four USDA selections were grown only at Brookings due to insufficient quantities of seed. Descriptions of the experimental plots are as follows:

Brookings: Planted, June 2; harvested October 1 (121 days); experimental design, randomized block with four replications; rows, 50 feet long, 3½ feet apart; seed piece spacing, 12 inches; fertilizer, manure (8 tons/acre); insecticide, post-emergence sidedress with Di-syston (5% active, 60 lbs/acre).

Watertown: Planted, June 3; harvested September 29 (118 days); experimental design, randomized block with four replications; rows, 50 feet long, 3½ feet apart; seed piece spacing, 12 inches; fertilizer, 6-4-0 (one-half ton/acre); insecticides, none.

Yield and scab data are given in South Dakota table 2. Yields at Brookings were generally superior to those from Watertown. Yields of B 2368-4 (Redskin) were superior at both locations however quality was somewhat impaired by late maturity.

South Dakota table 1. Foliage and tuber characteristics of 43 potato lines grown at Brookings, South Dakota, 1960.

Pedigree	Maturity Class	Foliage					Tubers				Remarks	
		Appearance ^{1/}	Flea		Hopper ^{2/}	Leaf Damage ^{2/}	Roll ^{2/}	Skin Color	Eye Depth ^{3/}	Tubers		
			Beetle ^{2/} Damage ^{2/}	Damage ^{2/}						Type		Area Scab ^{4/}
B B 73-3	L	G	1	1	1	2	W	M	1	2	T	
B B 355-35	L	E	1	1	1	1	W	M	1	3	1	
B B 920-7	M	F	2	3	3	2	W	S	1	2	1	
B B 927-1	L	E	1	1	1	0	W	S	1	1	1	
B B 2162-36	M	F	3	3	3	1	R	S	1	T	T	heat sprouts
B B 2874-4	L	G	1	1	1	1	R	M	1	4	1	
B B 2894-24	L	G	1	1	1	1	W	M	1	2	T	
B B 2922-26	E	F	4	3	3	3	W	M	1	4	3	blackleg severe
B B 3140-36	M	G	3	3	3	3	W	S	3	2	2	
B B 3172-13	M	G	2	1	1	3	W	M	1	3	2	
B B 3319-30	M	F	2	2	3	1	W	M	1	2	1	spindle tuber
B B 3401-4	L	G	1	1	1	1	W	M	1	4	1	
B B 3427-7	M	G	2	2	1	1	W	S	3	2	1	tubers off-shape
B B 3428-20	E	F	3	3	3	3	W	S	1	2	1	blackleg severe
B B 3428-31	L	G	1	1	1	2	W	M	2	2	1	
B B 3428-41	M	G	1	3	3	1	W	M	1	2	3	tubers off-shape
B B 3453-2	M	G	2	2	2	1	R	?	4	4		rugose mosaic severe
B B 3454-5	L	G	2	2	2	1	R	M	1	1	1	rugose mosaic severe
B B 3556-11	L	G	1	1	1	1	W	M	1	2	1	
B B 3599-11	L	F	0	0	0	0	W	S	1	4		tubers off-shape
B B 3775-1	E	G	3	2	2	1	W	S	3	2		tubers off-shape
B B 3726-6	M	G	2	2	2	0	W	S	2	2	1	
B B 4084-1	L	P	2	0	0	0	W	M	2	2	1	second growth
B B 4085-1	L	G	2	2	2	0	W	M	1	2	T	rugose mosaic severe
B B 4093-11	M	F	2	0	0	1	W	D	2	1		tubers off-shape
B B 4093-18	L	E	1	1	1	1	W	S	3	4		
B B 4094-1	M	E	2	1	1	0	W	M	2	3		
B B 4094-21	L	F	2	1	1	0	W	S	2	4		Colo. beetle severe
B B 4144-5	M	P	4	2	2	1	W	S	2	2	2	second growth
B B 4159-2	L	G	2	2	2	1	W	S	2	3	2	
B B 4160-1	M	G	2	2	2	0	W	S	2	3	2	Colo. beetle severe
B B 4170-7	M	E	1	0	0	0	W	M	2	3	3	Colo. beetle severe
B B 4212-1	E	G	2	2	2	2	R	S	1	2	1	

continued

South Dakota table 1, continued.

	M	G	2	1	3	W	S	1	4	1	tubers off-shape
B 4290-7	M	G	2	1	3	W	S	1	4	1	
B 4321-24	M	G	2	2	1	W	D	1	4	2	
B 4461-21	M	G	2	2	1	R	S	1	4		
B 4511-11	L	E	1	1	1	W	S	1	2	T	
La 42-45	L	G	2	1	0	R	S	1	1	2	
La 91-78	M	F	3	2	1	W	M	2	2	1	
La 61-125	M	F	3	2	0	W	S	1	3	2	
La 62-162	L	E	0	0	1	R	S	1	T	T	
Checks:											
Norland	E	G	2	3	2	R	S	1	4	T	Colo. beetle severe
Red LaSoda	M	E	2	2	2	R	D	1	2	T	

1/ E, excellent; G, good; F, fair; P, poor
2/ Rating system 0-4; 4-severe
3/ S, shallow; M, medium; D, deep
4/ Type: 1 - small, superficial
2 - large, superficial
3 - large rough pustules
4 - large, rough, deeply pitted

5/ Percent of surface area
T - less than 1%
1 - 1-10%
2 - 11-30%
3 - 31-50%
4 - 51-100%

Area: T - less than 1%
1 - 1-20%
2 - 21-40%
3 - 41-60%
4 - 61-100%

South Dakota table 2. Yield and scab reaction of potato lines grown at Brookings and Watertown, South Dakota, 1960.

Pedigree	Brookings				Watertown			
	Yield/Acre	U.S.No. 1	Scab ^{1/}		Yield/Acre	U.S.No. 1	Scab ^{1/}	
	Cwt.	Pct.	Type	Area	Cwt.	Pct.	Type	Area
50B9-8	211	92	1	2	85	94	1	3
B 69-16	159	91	1	1				
B 605-10	158	90	1	1	83	86	1	2
B 2368-4	180	94	2	2	112	97	1	1
B 2368-13	178	86	1	4	71	85	1	3
B 3139-24	73	72	2	2	33	82	2	2
B 3309-8	74	63	2	4	41	80	1	4
B 3352-8	188	91	1	T	77	91	1	T
B 3604-19	136	87	1	4				
B 3653-15	145	70	1	3				
B 3692-4	116	88	1	T				
B 3696-13	114	83	1	3	83	83	1	4
B 3837-4	140	74	1	T	82	78	1	2
B 3857-19	172	86	1	2	83	90	1	2
B 3900-3	142	72	1	3	65	82	1	2
B 3903-1	142	73	1	2	55	85	2	1
B 3947-2	94	84	1	1	46	78	1	1
B 4090-3	194	85	1	3	81	93	1	4
B 4134-14	78	64	2	3	49	82	1	1
B 4158-1	121	80	1	T	39	49	1	1
Norland	169	90	1	3	89	90	1	3
Red LaSoda	230	91	1	1	93	90	1	2
L.S.D. 5%	32				13			

^{1/} See footnote No. 4, table 1.

TEXAS

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Screening and Evaluation of Potato Varieties and Breeding Lines

The potato program consisted of evaluating breeding lines in 5-hill plot plantings at different locations, growing seedling tubers at 2 locations, yield plots at 3 locations within the State, and a seed piece treatment plot.

Many of the 5-hill planted lines were grown in 5 locations: 1) Lower Valley, 2) Winter Garden Station, 3) Brazos Valley, 4) Prairie View and 5) Munday. A total of 264 breeding lines were available for the 5-hill plantings, most of which were included in each of the first 4 locations and 156 were included in the Munday planting. These lines were scored at each location for plant maturity and vigor and for tuber production, appearance and color. From the 264 original lines 47 were indicated as worthy of further testing and 10 of this number rated high enough to warrant yield trials another year. A combined evaluation report for the lines selected for further testing is reported in Texas table 1.

About 5 thousand seedling tubers were grown from 21 hybrid combinations. These were planted on the Winter Garden Station and in the Brazos Valley; from this material 31 single-hill selections were made. The seedling selections were shipped to Presque Isle, treated to break dormancy and planted immediately for seed increase. Selections made from this phase of the work represent 12 families and are reported in Texas table 2.

Replicated yield tests of varieties and breeding lines were conducted at the Winter Garden Station, Brazos Valley and Prairie View. The planting at the Winter Garden Station did so poorly that for all practical purposes it may as well be reported as a crop failure. Results from the other 2 locations are reported in Texas tables 3 and 4.

A replicated seed piece treatment was planted at the Winter Garden Station to study the effects of different chemical treatments on the incidence of silver scurf. The treatments and the potatoes for this work were supplied by Dr. Al Benson of North Dakota. Results of this work will be reported by Dr. Benson.

Texas table 1. Evaluations of repeat selections grown in 1960.

Pedigree No.	Mat. ^{1/}	Vig. ^{1/}	Prod. ^{1/}	App. ^{1/}	Color ^{2/}	Score ^{3/}	Recommendation
B 313-21	2	3	2	2	W 3	3.2	Repl. yld. test
B 3599-8	3	3	3	2	"	2.0	Repeat 5-hill plots
B 3833-24	3	3	2	3	"	2.2	" " "
B 4083-3	3	3	2	2	W 2	2.8	Repl. yld. test
B 4119-1	3	3	3	3	R 4	2.0	Repeat 5-hill plots
B 4269-11	3	3	3	3	W 2	2.0	" " "
B 4269-16	3	4	3	3	W 3	2.0	" " "
B 4446-1	3	3	3	3	"	2.0	" " "

continued

Texas table 1, continued.

B 4563-2	4	2	2	4	W 3	2.0	Repeat 5-hill plots
B 4590-5	4	3	2	3	R 5	2.2	" " "
B 4591-4	3	2	2	3	"	2.2	" " "
B 4748-1	3	3	3	3	W 3	2.0	" " "
B 4759-1	3	4	3	3	W 2	3.5	Repl. yld. test
B 4766-1	3	3	3	3	W 3	2.2	Repeat 5-hill plots
B 4767-1	3	2	3	3	R 3	1.8	" " "
B 4767-5	3	3	2	3	R 1	2.2	" " "
B 4767-7	4	3	3	3	R 4	2.4	" " "
B 4773-1	4	3	2	2	W 4	2.8	Repl. yld. test
B 4814-5	4	3	2	3	W 3	2.0	Repeat 5-hill plots
B 4824-3	3	2	2	3	"	2.8	Repl. yld. test
B 4825-1	3	3	3	3	"	2.2	Repeat 5-hill plots
B 4825-3	4	2	2	3	R 5	2.2	" " "
B 4828-1	2	3	3	3	R 1	2.2	" " "
B 4840-4	3	3	3	2	W 3	2.2	" " "
B 4841-3	4	2	2	3	"	2.2	" " "
B 4841-6	3	3	3	3	"	2.2	" " "
I 1076-1	3	2	3	4	"	1.8	" " "
I 55326-1	3	3	3	3	R 4	1.8	" " "
I 5606-1	3	3	3	3	R 3	1.8	" " "
I 5637-1	3	2	3	3	R 3	2.0	" " "
I 5639-2	3	2	3	3	R 5	3.4	Repl. yld. test
I 5639-3	3	2	3	3	R 5	3.8	" " "
I 56179-1	4	3	3	3	W 3	2.2	Repeat 5-hill plots
I 56179-3	3	3	3	3	W 2	3.2	Repl. yld. test
I 56194-2	4	2	2	3	R 2	2.2	Repeat 5-hill plots
I 56194-3	4	2	3	3	R 4	2.2	" " "
I 56260-2	3	3	3	3	W 2	2.0	" " "
I 56313-1	3	3	3	2	R 6	2.8	Repl. yld. test
I 5707-1	3	3	3	3	W 2	1.8	Repeat 5-hill plots
I 5768-2	3	3	3	3	R 6	2.2	" " "
I 5787-1	3	3	2	3	W 3	2.6	Repl. yld. test
I 57317-4	3	3	3	3	W 2	2.0	Repeat 5-hill plots
I 57324-1	3	3	3	3	W 3	1.8	" " "
I 5821-1	4	3	4	4	W 3	1.6*	" " "
I 5821 R-1	3	3	3	3	W 3	1.8	" " "
I 58160-1	3	2	3	3	W 3	2.0	" " "
I 58384 R-1	3	3	3	3	R 4	1.8	" " "

1/ 1 = best, 5 poorest

2/ Color intensity factor: 1 very light; in case of red varieties Red LaSoda taken as R7.

3/ Rated: D = discard, 0; R = repeat, 3 points and A = advance, 5 points.

* This line retained because of high specific gravity-1.090; which was highest reading for any line checked.

Texas table 2. Selections made from seedling tubers in Texas and shipped to Maine for increase, 1960.

Pedigree No.	Parentage	Resistance in line
4992-1	B 294-29 x Redskin	Reds, Sc. and AI
" -2	" "	" "
" -3	" "	" "
" -4	" "	" "
4994-1	B 929-32 x B 3556-12	Lb, sc, XI, AI, VW, Lv.
" -2	" "	" "
5000-1	B 3114-6 x B 3478-45	Lb, sc, R. rot
" -2	" "	" "
" -3	" "	" "
" -4	" "	" "
" -5	" "	" "
5002-1	B 3139-24 x B 4085-6	Lb, sc, R. rot, AI; YR, VW
" -2	" "	" "
5003-1	" x B 4154-2	Rus, Lb, sc, rot, YR, VW, Lv.
" -2	" x "	" "
5009-1	B 3429-23 x A 180-26	Rus, Lb, sc, XI, AI, VW
" -2	" "	" "
5016-1	B 3725-1 x Yampa	Lb, sc, AI, Rk Nem.
" -2	" "	" "
" -3	" "	" "
" -4	" "	" "
" -5	" "	" "
" -6	" "	" "
5025-1	B 4087-5 x Merrimack	Red, Sc. AI, Lr.
" -2	" "	" "
5043-1	B 789-388 x Katahdin	AI, YR, Lr.
" -2	" "	" "
5069-1	Onaway x B 3692-4	Lb, sc, AI, C. and spt.
5091-1	B 607-56 x Redskin	Reds, Lb. sc. R. rot.
5133-1	B 606-37 x B 3139-24	Lb, sc, R. rot, VW, XI, AI, YR
" -2	" "	" "

Texas table 3. Yield Test, Brazos Valley.

Pedigree No. or Variety	Parentage	Yield per acre	Specific Gravity	Remarks
Redskin	Pontiac x 400-1	Cwt. 80	1.071	Sl. irreg., rough
Kennebec		59	1.064	rough
BL 4472-1	B 595-76 x B 3944-11	63	1.071	good type; A*
BL 4476-4	B 606-37 x "	77	1.074	poor type, irreg.
" -5	" x "	85	1.072	fair white; A.
BL 4495-1	B 3428-20 x B 3139-24	27	-	drop
BL 4576-1	B 595-76 x Katahdin	31	1.071	sprouting; drop
" -2	" x "	70	1.069	fair type; A.
BL 4590-2	Pontiac x Redskin	95	1.069	fair red; A.
BL 4593-2	Triumph "	102	1.061	pale, rough; drop

continued

Texas table 3, continued.

BL 4593-5	Triumph x Redskin	107	1.071	good red; A.
IL 5681-1	I 1107-3 x I 1077W28-5	57	1.074	sl. rough; drop
" -2	" x "	15	-	poor; drop
IL 56281-6	X 927-3 x La. 1859	66	1.077	poor shape; drop
IL 5711-1	I 801-10 x I 1077 W28-5	81	1.082	fair white; A
IL 5742-1	" x "	60	1.077	sl. rough; drop
" -2	" x "	80	1.074	irreg. shape; drop
" -3	" x "	71	1.070	" drop
IL 5757-1	I 1106-5 x "	50	1.076	flat tubers; drop
"	" x "	31	1.068	long, pointed; drop
IL 5774-1	I 1133-1 x Katahdin	64	1.078	sm. and irreg; drop
" -2	" x "	37	1.085	sm. and irreg; drop
" -4	" x "	62	1.079	irreg., knobby; drop
IL 57410-1	La. 1354 x I 1027-18	45	1.078	elong. not attr; drop
" -2	" x "	69	1.075	fair med; A
Sebago		50	1.060	small; drop
L.S.D. 5%		25	0.005	
L.S.D. 1%		37	0.007	

* Lines marked A should be continued in replicated plantings at several locations.

Texas table 4. Variety yield test, Prairie View, 1960*

Variety	Replication				Yield Per Acre	Remarks
	1	2	3	4		
					Cwt.	
Teton	21.8	14.2	10.5	9.0	60	Late, vigorous
Cherokee	22.2	6.0	11.1	6.5	50	" "
B 605-10	25.1	17.0	13.4	11.1	73	" medium
Triumph	9.0	13.0	12.2	6.0	44	Very early
Merrimack	12.6	10.7	6.6	5.3	38	Late, vigorous
Katahdin	21.5	14.4	12.9	10.2	64	Late
Chippewa	20.4	16.7	9.7	5.4	57	"
50 B-9-8	30.5	23.5	15.5	6.8	83	"
Onaway	25.9	12.2	8.0	9.8	61	Early
Saco	20.5	7.7	11.5	10.5	55	Late
Plymouth	12.2	10.0	4.5	10.0	40	"
Mohawk	12.7	19.2	8.7	8.8	54	"
Boone	3.8	6.2	3.8	3.5	19	Very late
Early Gem	8.3	9.8	12.7	9.5	44	Early
Marygold	10.5	7.6	7.0	7.2	35	Late
Pungo	18.0	18.6	13.4	7.9	63	Early
Pontiac	15.5	19.1	15.1	7.6	62	"
Kennebec	19.0	15.5	15.4	7.2	62	Very late
Delus	6.3	2.9	9.5	6.7	28	Late
Green Mountain	13.9	16.5	10.5	9.4	55	"
Tawa	11.9	8.6	7.5	4.0	35	Early
Irish Cobbler	18.8	9.1	11.5	9.1	53	Very early
Red LaSoda	29.4	31.9	20.1	13.4	103	Late
Catoosa	16.5	4.0	13.2	11.0	49	Late, medium
White Rose	14.1	19.6	15.8	7.9	63	Very late

*Planted March 7 and harvested June 10, 1960. Fertilized with 1000 lbs. 12-12-12 per acre, applied in bed. Weather conditions unfavorable for much of growing season. Heavy rains delayed planting date.

VIRGINIA (Blacksburg)

Flood S. Andrews

Varietal Tests

Sixteen varieties and numbered lots of potatoes were grown in randomized replicated test plots at the Virginia Agricultural Experiment Station, Blacksburg, Virginia, in 1960.

Experimental Procedure

Soil: Mostly Greendale silt loam, pH 5.2. Previous crop: Pepper followed by soybean-sudan grass cover crop. Plot size and arrangement: 3.5 feet x 30 feet randomized in blocks replicated four times. Seed tubers: Supplied through the cooperation of the U. S. Plant Industry Station, Beltsville, Maryland, cut into 1 1/2 oz. pieces after green sprouting for 10 days. Spacing: 12 inches apart in rows 3.5 feet apart. Fertilization: 1500 pounds per acre of a 5-10-5 fertilizer, applied 1000 pounds broadcast and 500 pounds mixed with soil in the row at planting time. Planting date: May 6, 1960. Harvest date: August 27, 1960.

Results

Inspection and roguing: Potato plants were inspected and rogued three times during the growing period and tubers were examined during harvest. Practically no sign of virus disease was found in any variety. A very few defects at harvest consisted mostly of undersize and misshapen. Diseases, if any, were well within the tolerance for certification.

Grading: At harvest, potatoes were graded into U. S. No. 1 and U. S. No. 1-B (small) and culls. Culls were mostly undersize. Practically no scab, soil rots or Fusarium was found.

Andrews table 1. Yield per acre and total solids of 16 varieties of potatoes tested at Blacksburg, Virginia, in 1960.

Selection or variety	Mean yield per acre			Total solids
	U.S. No. 1	U.S. No. 2	Total	
	Cwt.	Cwt.	Cwt.	Pct.
Kennebec	278.9 a	39.3 bc	355.7	18.30 ef
Red Pontiac	250.5 ab	26.1 bc	317.3	15.88 h
B 3653-15	231.9 abc	24.8 a	293.9	17.76 fg
Cherokee	209.1 bcd	24.0 bc	265.4	18.47 de
B 3453-2	207.1 bcd	24.0 bc	262.9	19.36 bc
Cobbler	207.1 bcd	22.8 b	262.6	20.11 a
Pungo	204.2 bcd	21.9 c	258.8	19.04 bcd
LaSoda	201.3 bcde	17.8 bc	254.2	16.23 h
B 605-10	197.9 bcde	16.6 bc	249.7	18.73 cde
B 73-3	190.9 cde	15.7 bc	240.8	19.58 ab
F 4713	179.3 cde	15.7 bc	226.4	19.36 bc
Boone	175.2 de	14.5 bc	221.0	16.04 h
F 5025	173.9 de	14.5 bc	219.4	19.04 bcd
Merrimack	163.6 de	14.1 bc	206.5	19.04 bcd
B 3599-11	161.5 de	17.7 bc	203.8	15.90 h
B 3428-31	147.0 e	10.4 b	185.0	17.54 g

Means not followed by the same letter are significantly different.

The data in Andrews table 1 show that varieties Kennebec, Red Pontiac and B-3653-15 produced yields which were significantly higher than those of Boone, Merrimac and four of the USDA numbered lots. Varieties Cherokee, B-3453-2, Cobbler, Pungo, LaSoda, and B 605-10 also produced yields higher than the mean yield of the 16 varieties tested. Cobbler, during the 1960 season, was highest in total solids. Other varieties relatively high in total solids were Kennebec, Cherokee, B 3453-2, Pungo, B 605-10, B 73-3, F-4713, F-5025 and Merrimack. On the other hand, Pontiac, which was second highest in yields, and LaSoda which produced satisfactory yields were both very low in total solids.

Boone, B 3599-11 and B 3428-31 rated low in yields and low in total solids. Boone, however, was outstanding in appearance having tubers which were smooth, bright and very attractive. Considering both yield and quality, Kennebec would be rated as highest of the sixteen varieties tested in 1960.

Potato Variety, Storage Experiment

The previous potato seed source studies, conducted in 1957, 1958 and 1959 by the Virginia Agricultural Experiment Station in cooperation with the Virginia Truck Experiment Station and the Florida Agricultural Experiment Station were continued in 1961. However, the 1961 studies were limited to treatments including the evaluation of the effects of storage temperature, variety, and previous number of years seed tubers were grown at Blacksburg, and their influence on yield and disease infestation, when these same stocks were subsequently grown at Blacksburg, Virginia and at Hastings, Florida.

Experimental Procedure

Treatments: (1) Five varieties were grown at Blacksburg for one year, and the tubers were held at 40°F. until about 10 days before planting. (2) The same varieties were grown at Blacksburg one year but were stored at 55°F. until 10 days before planting. (3) Four varieties were grown at Blacksburg for three years and the tubers were stored each year at 55°F. until 10 days before planting. (4) One variety was grown at Blacksburg for three years and stored at 40°F. and at 55°F. until 10 days before planting.

Locations: Each of the four lots were subsequently grown at Blacksburg in 1960 and evaluated for yield, and disease infestation. Two of these varieties were known before storage to have secondary leaf roll virus infestation. Three of the varieties of Treatment 3, including two that were infested with virus, were stored for three months at 55°F., 10 days before planting they were removed from storage and shipped to Hastings, Florida, where they were grown in a yield test and field indexed for disease.

Soils: Blacksburg, mostly Greendale silt loam pH 5.2. Previous crop, pepper followed by soybean-sudan grass cover crop; Hastings, Florida, Braden fine sandy loam pH 5.6 and Ona fine sand pH 5.8.

Plot size and arrangement: At Blacksburg, single row plots 3.5 feet x 30 feet, were randomized in each of four block replications. At Hastings, single row plots 3.5 feet x 20 feet, were arranged in a Latin square design consisting of six treatments and six replications.

Seed tubers: Held in storage until eight months for Blacksburg planting and three months for Florida planting. For Blacksburg, planting tubers were taken from storage and held at room temperature, in indirect light, for 10 days prior to planting and cut into 1 1/2 to 2 oz. pieces two days prior to planting. Tubers for Florida plantings were taken from storage about 10 days prior to planting and shipped by fast freight to Hastings and then cut into 2 oz. pieces prior to planting.

*Fertilizer: At Blacksburg 1500 lbs. per acre of a 5-10-5 applied; 1000 lbs/A--Broadcast, 500 lbs/A--mixed in row about the time of planting.

Seed Spacing: One foot apart in rows 3.5 feet apart.

Planting Date:

Harvest Date:

May 7, 1960 Blacksburg, Virginia
January 21, 1960 Hastings, Florida

August 27, 1960
May 6, 1960

Disease Index-Evaluation:

Made by Plant Pathologist (Dr. Eddins) in Florida;
Horticulturist and Pathologist at Blacksburg, Virginia.

Results

Two varieties, Pungo and Sebago previously known to be infested with leaf roll, developed a heavy secondary infestation both at Blacksburg and at Hastings. At Hastings, the leaf roll index rating was higher for 40°F. storage plants than 55°F. storage plants.

However, in Florida, mosaic appeared only on plants grown from 55°F. stored seed. No mosaic appeared on the plants grown from 40°F. stored seed.

Varieties Pungo, Sebago, and Cobbler, sprouted severely in 55°F. storage but Pontiac sprouted to a lesser extent. Kennebec sprouted less at 55°F. than the other four varieties. Undoubtedly sprouting reduced the vigor of the tubers stored at 55°F.

Andrews table 2 presents data showing that seed of four of the six varieties tested, that were not previously infested with virus, when held in storage at 40°F. produced, significantly higher yields at Blacksburg than the same varieties stored at 55°F. In no case did a variety stored at 55°F. yield higher than any stored at 40°F. Seed tubers of all three varieties stored at 40°F., when grown at Hastings, Florida, produced higher yields of U. S. No. 1 tubers than the same varieties stored at 55°F. regardless of virus infestation. The two varieties, Pungo and Sebago, previously infested with leaf roll virus produced relatively low yields, both at Blacksburg, Virginia, and at Hastings, Florida, in 1960. The low yields were not directly correlated with the virus index rating obtained during the growing season in Florida and in like manner the low yields were not completely accounted for by the 15° increase in storage temperature.

Andrews table 2. The influence of storage temperature, seed source and location on the yields of five potato varieties.

Variety	Storage Temperature Degrees F.	Cwt. per acre					
		Blacksburg, Virginia			Hastings, Florida		
		U. S. No. 1	U. S. No. 1-B	Total	U. S. No. 1	U. S. No. 1-B	Total
1. Pontiac	40°	199.8 bc	23.8	223.6 bc	105.4 a	41.9	146.8 a
2. Pontiac	55°	70.4 gh	9.3	79.7 fg	64.4 b	35.0	99.4 c
3. Pungo	40°	88.0 fgh	7.8	95.8 efg	72.9 b	32.3	105.2 bc
4. Pungo	55°	95.2 fg	9.3	104.5 efg	54.7 c	72.8	127.5 ab
5. Sebago	40°	51.2 h	7.3	58.5 h	84.4 ab	41.9	126.0 ab
6. Sebago	55°	36.2 h	9.3	45.5 h	69.8 b	36.5	106.3 bc
7. Kennebec	40°	241.2 ab	19.0	260.2 ab			
8. Kennebec	55°	166.7 cde	19.0	185.7 cd			
9. Cobbler	40°	183.8 bcd	38.3	222.1 bc			
10. Cobbler	55°	45.6 h	7.8	53.4 h			
*11. Kennebec	40°	285.9 a	20.7	306.6 a			
*12. Kennebec	55°	138.2 def	12.9	151.1 de			
*13. Pungo	55°	113.9 efg	9.8	123.7 ef			
*14. Pontiac	55°	38.3 h	6.7	45.0 h			
*15. Sebago	55°	34.2 h	9.3	43.5 h			

Lot numbers 1-10 were grown at Blacksburg one year (1959) before planting.

*Lot numbers 11, 12, 13, 14, and 15 were grown at Blacksburg three years (1957-1959) before planting.

The Kennebec variety (from the same seed source) grown at Blacksburg for three years, according to recommended practices, and stored each year at 40°F., produced significantly higher yields during 1960 than any other variety, from any seed source, including Maine-grown tubers.

These data, in accord with previous findings, indicate that seed potatoes of Kennebec variety can be successfully grown in Western Virginia. If grown according to recommended practices, Kennebec consistently produces high yields of U. S. No. 1 tubers. The tubers are relatively high in total solids and are usually sufficiently free of diseases to be well within the tolerance for the seed certification. This variety has generally produced high yields also in Florida and at Norfolk, Virginia.

Seed potatoes grown in Virginia and stored at 40°F. for six months or more, when subsequently grown at Blacksburg, Virginia, produced consistently and significantly higher yields than the same varieties stored at 55°F. for the same length of time.

Seed potatoes grown in Virginia and stored for only three months at 40°F. and then planted in Florida, during January, did not produce significantly higher yields than the same varieties stored at 55°F. for the same length of time, except in one year out of three (1961). Evidently the length of time the seed was held in storage at 55°F. and the severity of sprouting, were important factors in reducing vigor and yield. Potatoes stored at 40°F. sprouted less and yielded more than those stored at 55°F. when held for six months or more.

The practice of growing a representative sample of Virginia seed tubers in Florida and indexing these for disease prior to planting in Western Virginia or other later producing areas, is considered a sound practice for Virginia seed potato growers to follow.

A complete report of potato-variety seed source studies will be published in the near future by the Virginia Agricultural Experiment Station, possibly in the American Potato Journal.

VIRGINIA (Norfolk)

M. M. Parker

Ten named varieties and nine seedling selection lots of potatoes supplied by the U.S.D.A. were planted in test plots at Norfolk, Virginia, on March 25 and were harvested ninety days later on June 29.

Fertilizer treatment used in growing the crop consisted of broadcasting a 5-10-5 mixture at the rate of 600 pounds per acre and plowing it under several weeks in advance of planting, followed by 1500 pounds of a similar analysis mixture placed in bands slightly below the intended level of the seed piece and about two inches to each side at the time of planting. The covering disks of the combined fertilizer placement machine and seeder were adjusted so that an open furrow was left to permit accurate spacing and hand planting of the seed.

The seed pieces were put twelve inches apart in rows three and one-half feet apart with twenty-five seed planted in each of three non-randomized replications. However, only two of the replications were used for yield purposes, the third being used to furnish plants for digging at intervals during the growing season to determine the rate of maturity of the different lots and for other data recording purposes.

Dry soil conditions shortly after the plants came through the ground necessitated irrigating the plots unusually early in the growing season. Three applications of water were made at weekly intervals during the dry spell at the rate of about one inch per application. Following the third watering in mid-May, rain fell often enough and in sufficient quantity to keep the plants growing well until maturity. In general, other than the early three-week dry period, potato growing conditions were exceptionally favorable in eastern Virginia in 1960 and very large yields were obtained not only in the plots but also on nearly all local potato farms.

Parker, table 1 shows the relative standing of the named varieties and the seedling lots with respect to their yield of A and B size potatoes. The figures are the averages of two replications with twenty-five plants in each replication projected to an acre basis.

Onaway and Pungo were the two highest-yielding varieties in the 1960 tests, with perhaps no significant difference in yield between the two. Pungo, each year, has consistently been one of the highest-yielding varieties in our test plots, and due to this together with a desirable early maturity and suitability for either fresh market use or processing purposes, it has become a leading commercial variety in eastern Virginia.

Onaway is very similar to Pungo in both appearance and in yielding ability. However, it is not considered as suitable for processing as Pungo and, moreover, it does not seem to have as high a table quality. Its future here is uncertain.

Rushmore, which was intermediate in yield in the test plots, has created some interest among local commercial growers principally because of its long shape. They believe that consumers usually associate long tubers with good cooking quality and therefore, there might be a place for the production of a limited acreage of Rushmores.

Haig, if its yield could be improved, might also be suitable for limited production in eastern Virginia. It matures early, which is desirable locally from the standpoint of growing, harvesting, and also marketing the crop. In the test plots Haig gave only about half as much of a yield as did Pungo, but its low yield may have partly been due to a heavy infestation of what was taken to be the physiological form of leafroll. Just about 100 percent of the plants of this variety were affected.

Late maturing varieties, as can be seen in Parker table 1, giving the yields, are not adapted to eastern Virginia conditions and usually do not produce good yields. Ordinarily, we have slightly over 100 days of growing weather suitable for potatoes and after that the temperatures become too high for good growth and large yields.

None of the seedling lots produced yields as low as some of the named varieties, but neither did any of them yield as well as either Pungo or Onaway. However, many of the seedlings were superior in appearance to both Pungo and Onaway and it would seem that some of them, particularly if they had good processing characteristics, might be adapted to production here.

Table 2 gives the total yield of potatoes obtained from 50 seed pieces planted the first week in August from tubers harvested the end of June out of the 1960 variety and seedling test plots at Norfolk. The second planting was harvested in late October, or about 90 days after planting. The procedure of harvesting and replanting within a month of digging is followed by several growers in eastern Virginia who produce some home grown Pungo seed for planting the ensuing spring. Since certified seed is used each year to make the first planting, the homegrown stock is thus only one year removed from certification and is not greatly reduced in vigor nor disastrously infected with diseases. However, the locally grown fall seed, quite often, produces somewhat reduced yields the following spring when compared with the certified stock.

The practice of digging and replanting is possible with the Pungo because it has a very short rest or dormancy period requirement and will sprout fairly readily within a relatively short time of digging. In most cases yields not exceeding 60 to 70 cwt. per acre are obtained by this method of production with this variety, but since costs of production are low, it is an economical way of producing part of one's seed requirements.

The purpose of replanting all of the varieties and seedling lots within a month of digging was to determine if any of them could equal or surpass the Pungo when treated in this manner, and if so whether they would be as satisfactory for the production of a commercial crop in eastern Virginia.

As shown in Parker table 2, Pungo returned the largest yields followed by the varieties Ontario and Redskin and seedling B 4094-21. All others in the test produced yields decidedly inferior to the three leaders. Low yields, in some cases, were attributable to non-germination of the seed pieces in some lots, delayed or slow germination in others, and weak growth of the plants following germination. Also many of the varieties other than the Redskin became infected with what was taken to be the physiological type of leafroll and this, too, caused reduced yields. Although both Ontario and Redskin gave satisfactory yields, neither of them seemed to be well suited for commercial production here.

To determine how severely leafroll did affect the yield in the tests, ten severely infected and ten healthy Pungo plants were dug and the number and weight of the tubers from each plant was recorded. A total of 40 tubers weighing 8 pounds 4 ounces was obtained from the ten healthy plants and 27 tubers weighing 4 pounds 14 ounces from the diseased ones.

Parker table 1. Potato Yields from the Early Summer Crop at Norfolk, Virginia, 1960.

Variety	Yield per acre			Maturity
	A size	B size	Total	
	Cwt.	Cwt.	Cwt.	
Onaway	320	25	345	Medium early
Pungo	302	22	324	Medium early
Redskin	285	25	310	Late
Dazoc	250	47	297	Early
Rushmore	240	20	260	Medium early
Ontario	231	47	278	Late
Antigo	196	22	218	Late
Haig	151	52	203	Early
Navajo	129	32	161	Late
Blanca	124	55	179	Late
<u>Seedlings:</u>				
Ia 1037-1	263	35	298	Medium
B 3837-11	253	32	285	Late
B 3696-13	250	22	272	Medium
B 3428-41	238	30	268	Medium early
B 3299-13	236	17	253	Late
B 4094-21	216	25	241	Late
B 3454-14	213	30	243	Medium early
B 3140-36	211	22	232	Medium
B 3428-31	206	27	233	Late

Parker table 2. Late Potato Yields from August Plantings of Seed Produced in July at Norfolk, Virginia, 1960.

Fifty seed pieces per Plot Row				
	Tubers		Vines	
	No.	lbs. - oz.	No.	lbs. - oz.
Pungo	112	25-0	48	26-8
Ontario	112	21-4	45	16-4
Redskin	58	18-14	24	18-12
Onaway	48	7-4	27	8-0
Haig	50	6-2	23	4-12
Blanca	63	5-10	29	10-0
Rushmore	59	4-0	35	5-0
Dazoc	40	3-1	20	4-0
Navajo	18	1-12	27	4-4
Antigo	11	1-0	16	2-4
<u>Seedlings:</u>				
B 4094-21	124	21-0	39	13-14
B 3837-11	72	11-8	33	11-8
B 3696-13	79	10-0	22	7-0
B 3140-36	81	8-12	32	5-12
B 3428-31	39	4-4	21	4-0
B 3299-13	36	4-2	15	2-4
B 3428-41	21	1-8	13	2-0
Ia 1037-1	2	0-3	4	1-4
B 3454-14	3	0-1	18	1-12

WASHINGTON (Pullman)

S. B. Locke

As a result of reorganization of the potato research program in Washington, the testing of varieties and seedlings for leafroll resistance is being discontinued at Pullman and this work will be continued by Dr. Hoyman at Prosser, and other locations in the State. Approximately 3000 seedlings produced at Pullman were turned over to Dr. Hoyman last spring and about 2000, comprising ten different progenies, were tested at Pullman.

Infection in the field during the 1960 season at Pullman was almost exclusively by the leafroll virus. Infection averaged about 65 percent and varied among the different progenies from 45.8 to 100.0 percent (Locke table 1). In progenies having two susceptible parents infection ranged from 65.1 to 100.0. In progenies having one susceptible and one resistant parent infection ranged from 45.8 to 77.0%. No progenies were included having both parents resistant.

Among the resistant parents, B24-58 conferred the most resistance to its progenies (45.8 and 59.2% becoming infected) while X247-48, Katahdin and B2195-8 conferred less resistance to their progenies with 68.2, 69.3 and 77.0 percent infection respectively.

The seedling, B2193-48, was a parent in all progenies but one from which selections were made. It also appeared as a parent in one of the four progenies from which no selections were made. It would thus appear that this parent was more efficient in conferring the desired horticultural characteristics to its progenies than were the other, leafroll susceptible parents used. It was most efficient in this respect when combined with Russet Burbank and Katahdin, and least so when combined with B24-58.

Locke table 1. Survival of potato progenies under field exposure to infection by leafroll virus.

Progeny Numbers	Parentage	Cross Description	Field Tested	Leaf- roll	Selec- tions ^{3/}
			No.	Pct.	Pct.
PX5666 ^{1/}	A324-20 x A324-21	S x S ^{2/}	786	65.1	8.4
PX5678	A327-53 x A328-18	S x S	44	75.0	0.0
PX572	B2193-48 x B24-58	S x R	596	59.2	9.4
PX5711	A328-23 x B2193-48	S x S	428	70.1	10.2
PX5726	B2193 x Katahdin	S x R	163	69.3	18.0
PX5729	B2193-48 x B24-58	S x R	59	45.8	0.0
PX5810	Russet Burbank x PX552-1	S x S	2	100.0	0.0
PX5811	B2193-48 x B2195-8	S x R	84	77.0	10.5
PX5819	Russet Burbank x B2193-48	S x S	15	86.7	100.0
B2215	X247-48 x X157-9	R x S	22	68.2	0.0

^{1/}PX numbers refer to Pullman crosses.

^{2/}S = susceptible; R = resistant.

^{3/}Percent of non-infected survivors.

WASHINGTON
R. Kunkel and M. W. Carstens

Planting distances: At Mount Vernon, a non-irrigated area, the plants were spaced 12 inches apart in rows 42 inches apart. At Winchester and on the Royal Slope in the Columbia Basin, which is an irrigated area, the plants in the row were spaced 11 inches apart in rows 34 inches apart. (Kunkel tables 1 and 2).

Size of plots and number of replications: Each (single-row) plot was 20 feet long and each variety was replicated four times.

Fertilization: The fertilizer was applied in bands on each side and slightly below the seed piece. The varieties at Winchester were fertilized at the rate of 144 lbs. of N, 83 lbs. of P_2O_5 and 32 lbs. of K_2O per acre. The varieties on the Royal Slope were fertilized at the rate of 143 lbs. of N, 83 lbs. of P_2O_5 and 83 lbs. of K_2O per acre. The fertilizer used at Mount Vernon was 12 lbs. of N, 40 lbs. of P_2O_5 and 40 lbs. of K_2O per acre.

Planting date: The trial at Winchester was planted on May 4, the one on the Royal Slope on May 5, and the one at Mount Vernon on May 18.

Hollow Heart: Thirty-five tubers from each plot at the Winchester trial were cut lengthwise to determine the number of tubers affected with hollow heart.

Net Necrosis: The stem ends of 40 tubers from each plot at the Winchester trial were cut to determine the number of tubers affected by net necrosis.

Specific Gravity: These determinations were made with a potato hydrometer.

Blackspot: These determinations were made by dropping a 100-gram plug with a hemispherical end a distance of two feet onto the tuber. Thirty tubers from each plot were bruised twice, making a total of 120 tubers tested and 240 observations for each variety. The amount of discoloration which had developed after 24 hours was rated on a 0 to 6 scale. A value of 1 means that the point of impact was barely visible and a value of 6 would mean that the point of impact was a maximum black and the size of the end of the plug. Blackspots with an intensity rating of 0 to 2.5 are of no economic importance to the trade.

Kunkel table 1. Comparisons of potato varieties grown in two locations, Washington, 1960.

	Mount Vernon 1960			Winchester 1960				
	Yield per acre			Yield per acre				
Variety	Total	U.S.No.1's	U.S.No.1's	Total	No.1's	U.S.No.1's	Hollow Heart	Net Necrosis
	Cwt.	Cwt.	Pct.	Cwt.	Cwt.	Pct.	Pct.	Pct.
B 2368-4	550	506	92.	509	445	87	0	20
Menominee	542	465	86	457	301	66	0	12
Hunkel	540	465	86	575	450	78	7	6
Houma	540	446	83	515	388	75	0	0
Russ. Sebago	490	398	81	476	428	90	0	15
B 4102	488	438	90	450	391	87	0	12

continued

Kunkel table 1, continued.

F 117-1	479	396	83	419	370	88	.8	4
Teton	465	413	89	515	405	79	2	22
Plymouth	461	411	89	428	369	86	0	11
A 175-7	454	400	88	540	337	62	2	16
Cherokee	454	396	87	462	354	77	0	9
Saco	452	383	85	548	426	78	0	11
ND 4121-25	448	404	90	453	375	83	0	21
Merrimack	445	398	89	492	416	85	0	16
ND 3324-2	444	373	84	424	369	87	.8	29
L 42-45	442	365	83	573	480	84	0	9
Pungo	440	354	80	518	451	87	.8	12
Canso	438	396	90	435	366	84	0	2
Golden Chip	432	396	92	568	482	85	0	9
Kasota	429	333	78	445	389	87	0	10
ND 3815-1R	429	329	77	464	409	88	0	12
B 137-5	419	384	92	352	207	59	0	16
Manota	417	290	70	439	368	83.8	0	2
Redburt	415	354	85	627	577	92.0	0	9
137-5	413	373	90	442	294	66.5	1	12
Delus	402	367	91	460	444	96.7	2	2
F-29-1	402	338	84	508	438	86.2	0	18
ND 4122-2	402	333	83	513	419	81.6	8	32
B 73-3	388	342	88	437	375	85.9	0	2
Keswick	388	309	80	338	310	91.8	0	12
TL 3769	384	348	90	500	330	66.0	2	6
TL 4112	382	346	90	482	434	90.0	8	12
Rushmore	381	273	72	353	290	82.1	0	16
Early Gem	377	306	81	457	350	76.7	0	4
X 127-155	377	277	73	515	441	85.6	0	0
Norkota	367	267	73	373	326	87.6	0	4
ND 4359-2	359	306	85	315	276	87.5	0	27
Norland	354	256	72	486	433	89.1	0	14
ND 3740-11	350	269	77	433	347	81.1	0	39
F 52-9	348	286	82	283	242	85.4	1	2
Onaway	344	261	76	527	469	89.2	0	12
F 52-4	336	229	68	176	131	74.3	0	2
Osage	336	311	93	436	388	89.0	5	3
F 26-1	334	229	68	271	119	44.0	0	5
CS 132-22	331	254	77	367	282	77.0	0	7
ND 3694-6	315	175	55	326	273	83.5	0	12
Dazoc	315	211	67	443	381	86.1	0	7
Antigo	309	227	73	455	398	87.6	1	16
B 929-23	304	215	71	356	284	79.8	1	2
CS 122-40	290	186	64	274	178	65	0	3
Tawa	275	229	83	377	305	81	2	26
ND 3569-1	273	186	68	212	196	92	0	3
B 4144	273	231	84	186	145	78	0	2
F 52-8	263	213	81	215	181	84	0	4
ND 3676-21	246	87	35	400	351	88	0	6
F 52-5	242	185	72	206	171	83	0	1
CS 131-78	229	192	84	350	308	88	0	8
Red Beauty	219	162	74	246	198	80	0	10
Kennebec	-	-	-	513	396	77	0	3
L.S.D.	.05			91	78			3
L.S.D.	.01			121	105			4

Kunkel table 2. Differences among potato varieties in blackspot susceptibility when bruised by dropping a 100 gram plug from a height of two feet.

Variety	Mount Vernon 1959		Columbia Basin 1960		Royal Slope	
	Experimental Farm		Winchester			
	Sp. Gr.	B.S.I.	Sp. Fr.	B.S.I.	Sp. Gr.	B.S.I.
Redburt	1.095	1.6	1.089	0.9	1.080	2.0
Huinkel	1.096	-	1.086	1.2	1.081	1.6
La 42-45	1.088	1.8	1.088	1.1	1.076	2.0
Golden Chip	-	-	1.088	0.9	1.084	1.2
TL 1859	1.094	0.8	1.086	2.4	1.076	1.8
Saco	1.099	0.7	1.090	1.3	1.079	1.4
A 175-7	1.094	0.4	1.082	1.2	1.078	1.3
Onaway	1.085	1.5	1.084	0.9	1.077	1.6
Pungo	1.090	0.9	1.090	1.0	1.089	1.5
X 127-155	1.090	1.2	1.083	1.5	1.077	1.5
Houma	1.097	2.3	1.093	1.5	1.078	1.0
Teton	1.094	2.3	1.084	1.6	1.077	2.2
Kennebec	--	--	1.086	0.8	1.084	1.1
ND 4122-2	1.088	1.1	1.088	1.3	1.084	1.1
B 2368-4	1.095	1.5	1.087	1.7	1.083	2.2
F 29-1	1.093	0.5	1.085	1.3	1.079	1.1
TL 3769	1.085	1.8	1.079	2.3	1.067	1.9
Merrimack	1.099	0.1	1.091	0.9	1.086	0.9
Norland	1.079	1.4	1.077	1.3	1.073	1.5
TL 4112	--	--	1.082	1.3	1.080	1.1
A 180-24	1.086	1.1	1.089	1.1	1.076	0.9
Russ. Sebago	1.095	1.1	1.082	0.7	1.083	0.8
ND 3815-1R	1.091	1.8	1.092	0.7	1.079	1.7
Cherokee	1.103	0.5	1.090	0.6	1.088	1.1
Delus	1.103	0.9	1.097	2.2	1.093	2.3
Early Gem	1.082	1.4	1.080	0.6	1.075	1.9
Menominee	1.097	1.6	1.088	0.5	1.087	0.9
Antigo	1.088	1.2	1.087	1.8	1.083	2.2
ND 4121-25	1.087	0.6	1.085	1.0	1.079	1.2
B 4102	1.085	0.4	1.087	1.7	1.077	1.7
Kasota	1.090	0.8	1.082	1.1	1.078	1.2
Dazoc	1.091	1.4	1.082	0.7	1.075	2.0
B 137-5	--	--	1.085	1.0	1.079	1.1
Manota	1.085	0.9	1.086	1.2	1.076	1.7
B 73-3	1.099	1.7	1.096	2.2	1.082	1.2
Osage	1.089	1.7	1.093	1.2	1.082	1.5
Canso	1.094	1.1	1.094	1.4	1.080	1.3
ND 3740-11	1.083	2.0	1.075	0.8	1.076	1.5
ND 3631-6R	1.093	2.4	1.081	2.1	1.073	1.9
Plymouth	1.087	1.7	1.087	1.6	1.081	1.6
ND 3324-2	1.090	0.8	1.091	1.3	1.077	1.7
F 117-1	1.079	0.7	1.073	2.2	1.067	1.8
Russ. Burbank	--	--	1.082	0.2	1.087	1.0

continued

Kunkel table 2, continued.

A 180-26	1.085	--	1.086	1.4	1.079	0.9
ND 3676-21	1.099	0.5	1.094	0.7	1.085	0.5
Tawa	1.090	0.2	1.081	2.0	1.069	2.1
Norkota	1.094	1.8	1.089	1.0	1.081	1.4
CS 132-22	1.090	1.8	1.093	0.6	1.092	0.9
B 929-23	1.085	1.7	1.092	2.0	1.084	2.1
Rushmore	1.090	1.3	1.077	2.3	1.078	2.1
B 137-5	1.083	0.2	1.085	1.1	1.075	1.0
CS 131-78	1.095	1.7	1.087	1.7	1.077	1.9
Keswick	1.090	1.1	1.087	2.3	1.088	2.0
ND 3694-6	1.093	2.6	1.092	0.9	1.085	0.6
ND 4359-2	1.090	1.5	1.086	2.2	1.081	1.9
CS 118-89	1.092	--	1.087	2.0	1.079	1.6
F 52-9	1.093	2.3	1.087	1.3	1.083	1.6
CS 122-40	1.078	0.5	1.086	1.7	1.087	1.9
F 26-1	1.085	0.6	1.080	0.3	1.084	0.7
Red Beauty	1.092	2.0	1.082	2.4	1.083	1.7
F 52-8	1.084	1.2	1.075	0.5	1.078	0.6
ND 3569-1	1.085	2.0	1.083	2.3	1.084	2.4
F 52-5	1.093	2.4	1.085	1.5	1.074	1.9
La 61-125	1.086	--	1.087	1.5	1.074	1.0
B 4144	1.098	1.6	1.089	0.7	1.084	1.4
F 52-4	1.088	0.5	1.082	1.3	1.066	1.8
L.S.D.	.05		0.0060	0.84	0.0083	0.67
L.S.D.	.01		0.0080	1.10	0.0110	0.89

WASHINGTON (Prosser)

William G. Hoyman

Fifty-eight parental combinations were made in the greenhouse in such a manner that factors for resistance to leaf roll, scab and Verticillium wilt were present in the parents used for all the crosses. In addition to this resistance, one or both parents in some crosses introduced factors for resistance to late blight, powdery mildew, aster yellows, virus Y and virus X. Parents with high total solids content were used as much as possible. PI 214372 was used frequently as a male parent; it has never shown symptoms of leaf roll in Washington and its total solids content was 24.8 percent in 1960. B 3820-14, a selection very resistant to leaf roll and Verticillium wilt, was used extensively for either parent but was more fecund as a female.

The second screenhouse (96 x 32 feet) was constructed and ready for growing potted seedlings in 1960. Approximately 42,000 from 36 parental combinations were transplanted the latter part of May and the first three weeks of June into 3 1/2-inch clay pots and set on the ground floors. The potting soil had been sterilized with chloropicrin to eliminate weed seeds and soil pathogens. Irrigations were accomplished by flooding the floor of each house to a depth of about 2 inches. During the growing season a fertilizer containing all the major and minor elements was sprayed on the foliage twice. This method of growing seedlings produced larger tubers than the conventional greenhouse method previously used. Approximately 41,500 tubers were harvested from the 2 screenhouses. Thirty-three thousand of the B-size tubers were sent to Dr. Lind Sanford, Branch Experiment Station, Aberdeen, Idaho.

Approximately 22,500 seedling tubers were planted in the field at the Irrigation Experiment Station. Five hundred and ten single hills were selected for further increase and testing in 1961.

Included in the seedling plot at the Irrigation Experiment Station were 3,108 seedling tubers furnished by Dr. S. B. Locke. These were from 5 parental combinations in which one or both parents had resistance to the leaf roll virus. Using field symptoms as a criterion, the combination of B 247-48 x Triumf produced considerable resistance in the progeny.

In a leaf roll test of several selections and a few varieties, B 3820-14 and PI 214372 continued to remain symptomless in the field.

Forty-four advanced selections were planted at the Northwestern Washington Experiment Station, Mt. Vernon, for increase and natural exposure to the leaf roll virus. Ten showing the most leaf roll resistance were harvested for leaf roll and Verticillium wilt tests in 1961. Seven of the 10 had a total solids content of 22 percent and over.

Eight varieties and 37 selections were grown at the Irrigation Experiment Station for the purpose of determining their resistance to the leaf roll virus. Due to an epiphytotic of the aster yellows virus, it was not possible to obtain authentic leaf roll readings. Total solids content was taken as an aid in evaluating them as possible parents; the values are given in Washington table 1.

Washington table 1. Total solids content of varieties grown at the Irrigation Experiment Station, Prosser, Washington, 1960.

Variety	Total solids	Variety	Total solids
	Pct.		Pct.
X 96-56	20.3	B 3626-13	18.2
B 595-76	17.0	B 3627-18	21.4
B 721-35	17.7	B 3631-17	16.9
B 926-9	18.4	B 3631-26	21.4
B 929-23	20.1	B 3635-13	17.5
B 929-32	17.7	B 3710-1	16.9
B 1268-38	14.3	B 3721-3	17.1
B 3139-24	15.4	B 4083-7	17.1
B 3401-15	21.2	47153	19.2
B 3404-11	19.2	Delus	16.2
B 3413-7	17.7	Houma	20.3
B 3428-31	19.7	Kennebec	20.7
B 3539-9	20.3	Marygold	18.6
B 3556-12	19.7	Punjo	19.4
B 3557-14	19.9	Saco	18.4
B 3580-7	16.9	Red Pontiac	19.9
B 3597-8	18.8	Norland	17.1
B 3603-28	18.6	B 3820-14	19.7
B 3604-17	17.5	ND 4192-3	18.8
B 3606-5	18.4	PI 214372	24.8
B 3613-1	19.9		
B 3617-1	17.5		
B 3618-24	15.4		
B 3620-1	19.0		
B 3626-5	18.8		

WEST VIRGINIA

K. C. Westover and J. R. Shumaker

The testing and selecting of varieties and seedlings for desirable horticultural characteristics was carried on at the Reedsville Experiment Farm (altitude 1800 feet) by the Department of Horticulture. The breeding and screening for disease resistance was done by the Department of Plant Pathology at Huttonsville, West Virginia (altitude 2000 feet) and in the pathological greenhouse at Morgantown. With few exceptions, only seedstocks resistant to late blight were included in our plantings. In addition to the trial plantings at Reedsville all the seedstocks planted at Reedsville together with the new family-line populations were grown in an isolated planting in Canaan Valley (altitude 3250 feet), West Virginia. These plantings were frequently and thoroughly rogued by the pathologists and will provide "clean" material for next season's tests.

Two harvests were made--the first as soon as the young tubers were "set size" to perpetuate all the selections and varieties then on trial and the second harvest was in the early fall after the tops were killed and the tubers "cured" to provide planting material for the coming seasons' trials at Reedsville and Huttonsville.

Growing conditions at both locations--Reedsville and Canaan Valley were exceptionally favorable. The Reedsville plantings were on an Adkins silt loam which is deep and in good tilth. A heavy clover sod was turned under immediately before planting time. The Canaan Valley planting was on an Unger loam in equally as good tilth. Both the Reedsville and the Canaan Valley plantings were by machine and received a 1500-pound application of 5-10-10 commercial fertilizer applied bandwise. In all plantings the rows were 36 inches apart and, with the exception of the family line planting in Canaan Valley and the 10-hill unit planting at Reedsville, the spacing between sets was 10 inches.

Family line Planting. Thirty-one family lines totalling about 3400 tubers received from Beltsville were planted in Canaan Valley. The distance between sets was 40 inches. Ninety-eight selections, based primarily on tuber appearance, uniformity of size and yield were made. These selections are to be screened for disease resistance and will provide planting material for the coming seasons 10-hill unit trials at Reedsville and the increase planting in Canaan Valley.

10-Hill Unit Planting. Seventy-one units were planted from which thirty-four selections were made. The hills were 20 inches apart and the units were separated by a 40-inch space to permit machine harvest. Check units of Cobblers and Sebago's alternated every third unit in the row and were staggered in the rows across the planting causing each seedling unit to be abutted or flanked by at least one of the "checks" and not more than a row removed from the other. The selections made this year will become a part of next year's 50-foot row trial.

45-foot Row Planting. Twenty-four seedling selections and varieties were planted. Thirteen have been retained for further trial. A single row of each selection or variety was planted. Cobbler and Sebago check rows

alternated every third row causing each selection to be flanked by one of the check varieties and only a row removed from the other. Plant descriptions were taken at the time of full bloom and at harvest, two ten-tuber samples from each row were tested to determine the percent of the total solids. West Virginia table 1 summarizes the data, other than plant description, taken on those selections retained for further attention.

Replicated Planting. Seventeen seedling stocks from previous trials, together with eight named varieties--some on trial and the others used in the State, were included in this trial. The planting consisted of four replications of a single 45-foot row of each of the seedstocks in an incomplete (lattice) arrangement. At harvest two ten-tuber samples were taken from each row for total solid determinations. West Virginia table 2 summarizes the data, other than plant descriptions, taken from this trial.

West Virginia table 1. Yields, total solids and disease resistance information from selections from 45-foot row trials, Reedsville Experiment Farm, 1960.

Variety	Parentage	U.S. No.1's Cwts.	Off ₁ / Grade Cwts.	Off Grade Pct.	Total Solids Pct.	Resistant to 2/
B 4577-1 W. Va.	B 3209-35 x B 606-3	445	4.2	0.9	20.1	LB,X,A,Y,CRS
B 4518-9 W. Va.	B 96-28 x WV 14-17	416	19.6	4.5	21.6	LB
B 4518-14 W.Va.		396	57.2	12.6	21.4	
B 4518-11 W.Va.		395	31.6	7.4	23.1	
B 4582-7 W.Va.	B 3298-24 x B 3139-24	374	90.3	19.4	20.5	LB,S,RR,VW,A,Y
WV 37-56		368	63.9	14.8	21.4	
B 4518-10 W.Va.		363	23.4	6.1	20.7	
B 4302-5 W.Va.	B 2922-26 x B 3672-3	353	31.1	8.1	21.2	LB,S,VW
B 4518-6 W.Va.		353	113.3	24.3	24.0	LB
B 4577-2 W.Va.		333	16.8	4.8	20.9	
B 3721-3 W.Va.	Ac 25953 x B 3160-12	277	24.1	8.0	21.6	LB _{R1R2}
Delus	Mohawk x B 96-56	260	2.1	8.1	21.2	LB _{R1}
WV 35-12		223	28.2	11.2	24.0	
Cobbler checks	Average of 7	312	16.8	5.1	21.5	
Sebago checks	" " 7	326	11.2	3.3	19.6	

1/ Off-grade is based on total yield.

2/ LB_{R1R2} = Late blight (contains resistance genes 1 and 2), A=Virus A, Y=Virus Y, X=Virus X, CRS=Corky Ring Spot, S=Scab, RR=Ring Rot, VW=Verticillium Wilt.

West Virginia table 2. Yields, total solids and disease resistance information from replicated trials, Reedsville Experiment Farm, 1960.

Variety	Parentage	U.S. No.1's Cwt.	Off Grade Cwt.	1/ Off Grade Pct.	Total Solids Pct.	Resistant to 2/ LB
B 3739-3 W. Va.	3 NC-9 x Ac 25953	412	48	10.4	20.1	LB
I 1412-6 W. Va.	I 1077-W-28-5xI 902-3	374	10	2.7	19.6	S, LB _{1,2} , X
I 1333-2 W. Va.	X 927-3 x I 1077-13	361	21	5.4	19.7	LB _{2,3} , LR
B 3710-3 W. Va.	Ac 25953 x X96-56	359	26	6.7	20.8	LB _{1,3}
B 69-16	Katahdin x B 96-56	358	6	1.6	20.5	LB ₁
LA 1354-1	Pontiac x 92-36-5	353	2	0.7	19.5	
Boone	Cornell T 15 x B 231-3	353	11	3.0	19.6	LB ₁
Pontiac		350	89	2.5	18.3	
I 8140-I-LA	I 45-11-26 x X96-56	347	11	3.0	22.2	S
B 4295-6 W. Va.	B 929-32 x B 3558-12	332	16	4.7	18.8	LB ₁ S, X, A, VW, LR
Sebago		325	11	3.4	20.0	LB, S, A, YD
B 4362-3 W. Va.		323	11	3.2	20.9	LB _{1,2} A
B 2858-2 W. Va.	B 381-2 x Katahdin	309	12	3.8	22.6	LB
Katahdin		305	10	3.2	19.5	A, YD
B 4132-3 W. Va.	B 3097-82 x Katahdin	303	13	4.1	20.1	A, NN, S, LB, RR
I 1058-2 W. Va.	B 960-32 x B 762-46	296	7.64	2.5	20.2	LB, RR, S
Plymouth	Mohawk x 96 x 56	295	3.69	1.2	20.6	S, LB, A
I 1324-8 W. Va.	B 595-76 x Osage	295	10.84	3.5	22.1	S, LB(A-BC-BD)X, VW
Cobbler		282	23.29	7.6	22.0	W
B 4302-1 W. Va.	B 2922-26 x B 3672-2	265	14.37	5.1	21.4	LB _{1,4} S, VW
B 4362-1 W. Va.	B 922-3 x 96-56	264	69.93	20.9	20.8	LB _{1,2} , A
B 3718-4 W. Va.	Ac 25953 x B 2131-3	256	11.74	3.3	20.0	LB _{1,3}
Kennebec	B 127 x 96-56	249	7.92	3.1	20.8	LB ₁ , NN
Merrimack	Saranac x X 96-56	237	9.09	3.8	21.5	LB, EB, A, NN, RR
I 1412-3 W. Va.	I 1077-W28-5 x I 902-3	233	46.64	16.7	21.1	S, LB, X
L.S.D. 1%		27			2.4	
L.S.D. 5%		21			1.8	

1/ Off-grade is based on total yield

2/ LB=Late Blight (LB_{1,2}, contains resistance to R₁, R₂, etc.), S=Scab, X=Virus X, NN=Net Necrosis, RR=Ring Rot, LR=Leaf Roll, VW=Verticillium wilt, LH=Leaf Hoppers, A=Virus A, EB=Early Blight, W=Wart, YD=Yellow Dwarf, A=Virus A.

WISCONSIN

R. H. Larson, R. V. Akeley and A. E. Schark

Physiological Internal Tuber Necrosis

Field testing for resistance to the nonparasitic internal tuber necrosis on Plainfield sand at the Hancock, Wisconsin Substation during 1960 included 5 potato varieties and 7 seedling varieties. The indices are presented in the following table:

Larson table 1. Incidence of internal tuber necrosis.

<u>Variety</u>	<u>Necrotic Index</u> ^{1/}
Boone	0
Wyoming 1122	0
B 73-3	12
Avon	13
B 3604-1	13
B 2894-24	22
Ontario	25
F 4613	26
Fundy	28
B 884-19	52
B 2368-4	63
Hindenburg	69 ^{2/}

1/ Index: 100 = All tubers with severe internal necrosis
0 = All tubers free of internal necrosis

2/ Hindenburg was used because of its known susceptibility

WISCONSIN
G. H. Rieman

Potato Breeding Stocks Grown During 1960

Greenhouse Seedlings - 16,156 potato seedlings were grown in the greenhouse from "true" seed. The parentage of these seedling populations included clones resistant to scab, non-parasitic internal necrosis and potato virus X. The parental clones for the most part were early to medium in maturity and high in specific gravity.

A very essential addition was made to the Wisconsin potato breeding program during 1960 in the form of a new plastic greenhouse 20 ft. x 80 ft. at the University Potato Research Farm located near Rhineland, Wisconsin. More than half (9,790) of the total of new seedlings were produced in the new plastic greenhouse. In addition, the tuber size was much larger than the greenhouse-grown tubers grown at Madison.

First Clonal Generation - 6,751 single hills from Madison greenhouse tubers were grown in the field. Of this total, 1,193 were saved. An additional 504 single hills were saved from first clonal generation stocks which were replanted from the 1959 greenhouse tuber planting because these greenhouse grown tubers were too small to permit selection in the field.

This first clonal generation saved (1,193 plus 504) in the fall of 1960 will be greatly reduced at seed cutting time prior to planting when selections showing internal defects such as non-parasitic internal tuber necrosis will be discarded.

Second Clonal Generation - 563 selections were planted each in two 5-hill units. One unit was planted on the scab plot and one unit was planted in an isolated seed plot; 181 selections were saved. Again in this case the number of selections saved will be reduced at seed cutting time on the basis of internal tuber defects.

Third Clonal Generation - 220 selections were planted in the field in two areas. A 5-hill unit was planted on the scab plot and a 10-hill unit was planted in an isolated seed plot; 125 selections were saved. This number will also be reduced on the basis of internal defects at seed cutting time.

Older Clonal Generations - 379 selections were planted in two areas. A 5-hill unit was planted on the scab plot and a 10-hill unit was planted in the seed plot; 260 selections were saved. This group of selections includes the regular fourth generation clonal stocks, tester stocks such as low, medium and high resistance to scab and parental clones used in the crossing program.

Increase Series - 91 superior appearing selections from the third clonal generation group or the older generation group were planted in 25-hill seed increase units. At this stage, attention is given especially to vine type, tuber type and yielding ability; 66 selections were saved. This group of

saved selections will also be reduced at seed cutting time on the basis of tuber condition after storage, internal tuber defects and specific gravity.

Advanced Generation Trials (AG) - 120 selections were grown in two plots; 250-hill single row units were planted in a manner similar to commercial plantings in the area, 120-hill single row tuber units (30 tubers) were planted in a seed plot. The number of selections saved is usually reduced by 1/3 to 1/2. Selection at the Advanced Generation stage involves as closely as possible the over-all worth as a variety, including the yield of U. S. No. 1 tubers which requires commercial grading operations.

Wisconsin Observation Trial - 60 of the most promising Advanced Generation (AG) selections were grown in a yield trial - 4 replications with 20 hills per replicate. These stocks were grown in the same field with the North Central Regional trial on a farm some three miles from the Potato Research Farm. Diseased hills are not rogued in these yield trials and for this reason they are not grown on the University Potato Research Farm.

North Central Regional Trial - 16 selections and three standard varieties were grown in a yield and quality study trial - 4 replicates with 20 hills per replicate. Cooperators: Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, U.S.D.A. and Wisconsin, (see North Central Regional Trials by August E. Kehr).

Wisconsin AG29 Ready for Release - Selection Wisconsin AG29 has received favorable ratings in the North Central Regional Trial for a period of three years and it has been given a good account in various trials in Wisconsin.

Selection AG29 is an early maturing white-skinned potato in the Irish Cobbler Class. It is resistant to scab and non-parasitic internal tuber necrosis. It tends to produce tubers in the high specific gravity range resulting in high yields of dry matter per acre. Wisconsin AG29 has produced satisfactory chip color directly from the field and has reconditioned exceptionally well after four months in storage at 42°F.

Block Increases - 8 advanced generation (AG) selections have been increased in isolated seed plots. Wisconsin AG 59 is one of these 8 selections. About 4.5 acres of land was used in the block increases; 2.5 acres were used for the scab plot. About five acres in ten small plots were used for the various breeding stocks listed. Hill and tuber-unit indexing for virus diseases is accomplished by making readings at Fairhope, Alabama during the winter months.

A total of twelve acres were used for potato breeding and one acre was used for a spacing experiment making a total of 13 acres of potatoes. Potatoes are grown in a three year rotation with oats and clover. This makes a total of about forty acres used for potato breeding on the University Potato Research Farm located ten miles east of Rhinelander, Wisconsin.

A recessive type of immunity to virus X in the common potato

Hari Kishore and G. H. Rieman

A genetic study of immunity to virus X in the common potato was prompted by some unusual breeding results which occurred in seedling progenies obtained from immune derivatives of USDA selection 41956. Two graft-immune derivatives of selection 41956 and one susceptible selection unrelated to 41956 were chosen for parental materials. S_1 and S_2 generations of the parents were grown and F_1 and F_2 generations of two crosses involving the two immune parents and the susceptible parent were also grown. A total of 6,411 seedlings were tested for their reaction to virus X in the greenhouse. The S_1 and F_1 seed was produced in the greenhouse in 1956 and the S_2 and F_2 seed was produced under field conditions at Rhinelander during 1958.

A ring spot strain of virus X (X^{21} -Ladeburg, Larson and Walker 1950) furnished by R. H. Larson, was used throughout the five-year period of this study. The culture of the virus was kept pure by selecting periodically a single ring spot on Nicotiana rustica L. and reculturing on this host. Infectivity and/or virulence of the virus on potato was maintained by periodic recovery from inoculated potato seedling showing systemic mottle. The stock culture of the virus, multiplied on N. rustica, was preserved under dehydrated conditions and kept in a household refrigerator. All potato seedlings under test were inoculated twice with infective sap from virus infected leaves of N. tabacum var Havana 38 diluted 1:10. The first inoculation was made on three mid-portion leaves when the young seedlings consisted of at least 6 to 8 leaves ranging in size from 1/2 inch to 1 inch in diameter. The second inoculation was usually made one week to 10 days later. The inoculated seedlings were allowed to grow for a period of one month. Thereafter, the sap from well formed newly developed leaves was expressed and used to determine the presence or absence of systemic virus infection. The first test was made with serological antisera for potato virus X. All plants showing positive (clumping) reactions to the antisera were considered to be systemically infected with the virus and were classified as susceptible. All plants showing negative (non-clumping) reactions to the antisera were considered to be virus-free and were classified as resistant. The classification of resistant plants based on negative serological readings was confirmed by sap inoculation tests on Gomphrena globosa L.

Resistant seedlings resulting from selfing the susceptible parent AG 54.55 were subjected to graft-inoculation tests to determine their level of resistance or possible immunity to potato virus X. Similar tests were also made with S. 41956 derivatives X 137 and X 143. S_1 seedlings from AG 54.55 were grafted (1) on virus X infected susceptible seedlings using them as stocks and (2) on healthy Datura tatula (L.) Torr. used both as stock or scion. When the Datura grafts were established they were inoculated with the virus. Leaves from new shoots arising from both the stock and scion were used to test for the presence of the virus by sap inoculation on G. globosa, Capsicum annum L. and N. debneyi. Three sap inoculation trials were made on the indicator plants mentioned at intervals of three weeks. Virus X was recovered from 2 S_1 seedlings out of 24 which had been previously classified as resistant on the basis of serological and Gomphrena tests. These results indicate that the reaction to virus X of resistant S_1 seedlings from susceptible AG 54.55 appear to be similar to the

immunity reaction to this virus exhibited by USDA seedling 41956 and certain of its derivatives.

The following summary of the breeding results suggests the presence of a recessive type of immunity to virus X in the susceptible seedling AG 54.55.

Wisconsin table 1. Breeding behavior of immune and susceptible potato selections to virus X.

<u>Parents</u>	<u>Gen.</u>	<u>Res.</u>	<u>Susc.</u>
Susceptible Ag 54.55 (X)	S ₁	118	391
Immune X 137 (X)	S ₁	461	118
Immune X 143 (X)	S ₁	615	200
Four sel. from S ₁ of X 143			
Resistant X143-26 (X)	S ₂	86	31
Resistant X143-93 (X)	S ₂	92	2
Resistant X143-343 (X)	S ₂	121	16
Resistant X143-921 (X)	S ₂	68	17
<u>Grosses (Susc. X Imm.)</u>			
AG 54.55 X X137	F ₁	577	302
AG 54.55 X X143	F ₁	935	450
Seventeen sel. from F ₁ AG 54.55 X X143			
8 Susceptible sel. (X)	F ₂	all segregated for Res. and Susc.	
9 Resistant sel. (X)	F ₂	all segregated for Res. and Susc.	
	F ₂	Total 1,898	

(Total number of individuals tested 6,411)

Working hypothesis for genetic constitutions of parents

Susc. AG54.55 - aaaa Bbbb Cccc
 Imm. X143 - AAaa Bbbb CCcc
 Imm. X137 - AAaa Bbbb CCcc
 or AAaa Bbbb Cccc

1. Two dominant complementary genes A and B required for immunity (Stevenson 1939) or -
2. A recessive gene c in the homozygous required for immunity.

WISCONSIN

R. W. Hougas and S. J. Peloquin

Genetics and Cytogenetics of the Tuber-bearing Solanum Species
(Cooperative ARS, USDA and Wisconsin Station)

Continued emphasis was placed in 1960 upon studies related to haploidy in Solanum tuberosum and in the sub-species andigena. One major objective of the work program has been to develop more efficient methods for the "induction" of haploids from the common potato. Several factors with possible influence upon haploid frequency have been explored. The frequency of haploidy in the potato has been found to be influenced by 1) the choice of the S. tuberosum parent, 2) the choice of the "pollinator" and 3) techniques of fruit retention following pollination (e.g. decapitation of the female parent).

The effect of the "pollinator" on haploid frequency is of particular significance in accumulating a stockpile of haploids. The most outstanding "pollinator" previously recognized was 225682.1. The data of the past season confirm this result (Hougas table 1). Furthermore, two more outstanding "pollinators" (225682.13 and 225682.22) were found among 24 new pigmented S. phureja selections tested. It should be noted that 225682.22 is homozygous for the dominant gene P which conditions purple pigment in the young seedling and that the "pollinators" 225682.1 and 225682.13 are heterozygous for this gene. Use of these pollinators has greatly increased the efficiency of obtaining haploids from most S. tuberosum stocks. For example, 75 percent of the haploids obtained resulted from matings with these 3 "pollinators" even though such matings represented only 1/4 of the total.

Through the use of S. phureja "pollinators" coupled with the decapitation technique a total of 496 new haploids have been isolated from 13 varieties, 3 breeding selections and 3 selections of andigena (Hougas table 2).

Increased effort was made during the past summer to obtain haploids from selected superior parental clones rather than from commercial varieties. Seeds from these trials are currently being planted and the resultant progeny are being screened for haploids.

One hundred sixty-eight haploids were grown in the field during the past season. The genetic variation (i.e. size, vigor, fertility and yield) observed among these haploids was, in general, rather similar to the range previously reported for haploids US-W 1 - US-W 29 (American Potato J. 37:289-297).

Four-hill tuber units of 170 F₁ hybrids (S. tuberosum haploid-cultivated diploid species) were grown in the field. Twenty-four of these 24-chromosome selections produced a 90-day yield of 2½ or more pounds per hill. Additional F₁ and BC₁ populations were grown for selection and for further matings.

The extent of self-incompatibility in the diploid species was determined by selfing 24-48 seedling clones of 19 families representing 12 species. A low level of self-compatibility (pseudo-fertility) was found among certain seedling clones in 8 of the 12 species extensively tested in the field. The number of clones that would self and the level of self-compatibility were both increased by making use of the decapitation technique and keeping the decapitants in an air-conditioned greenhouse (18-22°C). These results indicate the possibility of obtaining genetic or environmental pseudo-fertility in many of the diploid species.

Hougas table 1. Summary of Haploids by "Pollinator".

"Pollinator"	Flowers pollinated	Fruit	Seeds	Haploids	Haploids per 100 fruit
	No.	No.	No.	No.	No.
<u>S. phureja</u>					
225682.1	6047	1162	5611	119	10.2*
225682.3	881	175	130	2	1.1
225682.4	743	219	54	4	1.8
225682.13	2105	659	1101	80	12.1*
225682.14	568	175	49	2	1.1
225682.15	4410	856	317	3	0.4
225682.16	3531	747	243	5	0.7
225682.17	3249	612	355	9	1.5
225682.18	5594	1196	1331	13	1.1
225682.19	3548	744	1952	6	0.8
225682.20	473	132	62	2	1.3
225682.21	5123	1464	882	29	2.0
225682.22	6343	1731	3248	179	10.3*
225682.24	2808	930	1087	2	0.2
225682.25	4619	1271	1445	16	1.3
225682.26	2722	788	2057	5	0.6
225682.27	116	42	6	0	0.0
225682.28	1055	191	17	1	0.5
225682.29	1157	412	545	3	0.7
225682.30	59	5	0	0	0.0
225682.31	1993	475	381	6	1.3
243466.10	750	217	284	0	0.0
225695.10	429	106	3	0	0.0
225695.11	1081	269	54	1	0.4
195198.9	369	67	14	0	0.0
195198.11	221	59	43	0	0.0
Dodd's 11.2	1237	243	272	1	0.4
225679.10	192	45	4	0	0.0
225703.10	174	27	6	0	0.0
225706.10	1299	431	647	1	0.2
US-W 4				1	
Unknown?				6	
Total	62,860	15,450	22,200	496	3.2

Hougas table 2. Summary of Haploids by Parent.

Parent	Flowers pollinated	Fruit	Seeds	Haploids	Haploids per 100 fruit
	No.	No.	No.	No.	No.
Cherokee	2625	989	1423	35	3.5
Chippewa	22,670	6017	3385	49	0.8
Katahdin	4929	992	392	11	1.1
Kennebec	2632	685	658	10	1.5
Menominee	4119	796	446	11	1.4
Merrimack	9496	1812	5140	188	10.4
Pungo	456	86	43	1	1.2
Russet Burbank	125	21	1	0	--
Russet Rural	1090	351	256	4	1.1
Saco	3884	1122	1496	30	2.7
Sequoia	3125	835	211	6	0.7
Tawa	2922	1271	6593	67	5.3
White Rose	776	136	327	3	2.2
AG-231	2622	614	1270	74	12.1
8 plant groups	119	32	514	2	6.3
<u>andigena</u>	1281	117	410	4	3.4
Early Gem				1	
Total	62,871	15,876	22,565	496	3.1

WISCONSIN

F. J. Stevenson^{1/} and C. E. Cunningham^{2/}

Red Dot Foods, Inc. grows about 2500 acres of potatoes on its farms in Wisconsin and Alabama. The potatoes produced supply about 40 percent of the annual requirements of the various chip factories owned and operated by the company.

The varieties grown on most of the acreage in Wisconsin are: Early Ohio for the summer crop and Kennebec for the storage crop, although some Kennebec is chipped direct from the harvest field. In Alabama the Russet Sebago is grown for spring and early summer use. All of these varieties, like every other known potato variety, have a number of desirable characters combined with several unwanted traits. The research program is concerned with replacing these varieties with superior sorts.

Since Red Dot grows potatoes under a wide range of conditions it is improbable that one variety will perform to its full capacity at all locations or on all the acreage at one location. The first concern of the research program, therefore, is to breed a number of varieties, each of which will be superior in yield, percentage solids and chip quality when grown in a particular location, under the conditions of soil and climate peculiar to that location. A wide range of adaptability is not so important as outstanding performance in a specific set of environmental conditions.

In the breeding of such varieties many characters are involved. High yield, high dry matter and high chip quality must be combined with early maturity, smooth shape, shallow eyed tubers, good keeping qualities under various temperatures and conditions of ventilation, and high speed of reconditioning after cold storage.

A variety may possess most of these desirable characters and be outstanding under careful methods of growing and handling but under other conditions it may give a mediocre performance. Because of this, tests are made to determine the cultural practices that will give the best results with a specific variety in a specific location. These tests include seed treatments, weed control, and kind, amounts and methods of application of fertilizers. Factors affecting handling, grading, transportation and storage such as maturity, rest period and reactions to various storage temperatures and other conditions are studied. Genetic studies to determine the parents that transmit superior chip quality to a high percentage of their progeny are an important part of the program. The reactions of parents, progenies and varieties to such diseases as verticillium wilt, internal necrosis, common scab and late blight and the combining of disease resistance with other characters of economic value constitute another significant part of the research work.

In 1960 the program followed the same lines, with certain modifications and expansions, as were described in the National Potato Breeding Report for 1959.

1/ Director of Research, Red Dot Foods, Inc. and U.S.D.A. Collaborator.

2/ Geneticist, Red Dot Research Program.

Seed produced in the greenhouse at Madison--about 330 crosses and selfs were made in the greenhouse. It was estimated that approximately 380,000 seeds were produced.

New seedlings first year in field at Rhinelander--about 22,000 new seedlings representing 100 family lines were planted on the Research Farm at Rhinelander. Of these, 16,700 were grown from seed in the greenhouse at Madison and 5300 were received from the National Potato Breeding Program, Beltsville, Maryland. About 9 percent of these were selected at harvest time.

Seedlings second year in field--about 2,240 selections were grown for the second year in the field. These were grown in 10-hill rows. Of these, 602 were selected and samples of each placed in 50° and 42° storage.

Seedlings third, fourth and fifth year in field--948 advanced seedlings were grown in 20-hill rows. Of these, 357 were selected for further tests. All of these selections are to be tested for their reactions to various storage temperatures with special reference to speed of reconditioning after cold storage.

Yield, percentage solids and chip color^{1/} - About 200 seedling varieties were grown in replicated yield trials. One test of 37 named and numbered varieties was planted in 6 complete blocks on May 16. The plots were single 25-hill rows, one foot between plants in the row and 3 feet between rows. The varieties were randomized within the blocks. Three blocks were harvested on August 15, and the varieties compared with Early Ohio, the other 3 blocks were harvested September 19 when the comparisons were made with Kennebec.

On August 15 Early Ohio yielded at the rate of 169 hundredweight of potatoes per acre. It was outyielded by 13 varieties Red Dot numbers 1, 4, 7, 19, 21 and 28, also Kennebec, Norland, Plymouth, Pungo, Saco, F4631 a Canadian selection, and Ag 29 a University of Wisconsin seedling. Blanca was the only variety outyielded by the check. Golden Chip did not outyield Early Ohio significantly. Kennebec yielded 47 hundredweight more than Golden Chip.

The percentage solids ranged from 16.4 for Red Dot 20 to 20.6 for Early Ohio. The average for all varieties was 18.9 and the least significant difference between variety means was 1 percent. Red Dot numbers 1, 6, 15, 25, 26, and Ag 29, B 3749-5 and Saco were in the same class as Early Ohio. Red Dot 4, 5, 7, 16, 19, 27 and Blanca, Navajo, Plymouth, B 3404-11 and F 4631 produced tubers with 19.0% solids or higher although they were statistically lower than the Early Ohio.

The chip color shortly after harvest ranged from 80 to 89 with an average of 86. The least significant difference between variety means was 3. Statistically several varieties were lower in chip color than Early Ohio but none of them scored lower than 80 or in other words the chips made from all 37 varieties were commercially acceptable.

^{1/} Red Dot chips are scored in a range of points from 50 to 90. Chips with an index of 55 are extremely dark. Chips scored 80 or above are commercially acceptable. Those scored 90 have the top chip color.

When the 37 varieties were harvested on September 19, Kennebec yielded 399 hundredweight of potatoes over 2" in diameter. The LSD for yields over 2" was 58 hundredweight. Russet Sebago with a yield of 464 cwt. per acre outyielded Kennebec significantly. Red Dot 20 and 21, Huron, Pungo, Saco and F 4631 outyielded Kennebec, but not significantly. Fifteen varieties Red Dot numbers 20, 21, 24, 26, 27, 28 and Golden Chip, Huron, Katahdin, Navajo, Pungo, Saco, B 4090-55 and F 4631 were in the same class in yield as Kennebec. Golden Chip yielded 389 cwt. as compared with 399 cwt. for Kennebec; not a significant difference.

Percentage solids ranged from 16.8 to 20.1 with an average of 18.4. The LSD between variety means was 1.2%. Saco was the only variety that was significantly higher in solids than Kennebec. Thirty other varieties were in the same class as Kennebec in percentage solids. The Kennebec tubers produced 18.8% solids, those of Golden Chip 18.4% not a significant difference.

The yields of solids per acre were calculated as a product of the total yields and the percent solids. Saco ranked first with about 9,000 pounds per acre. Huron a recently named Canadian variety was a close second, Russet Sebago ranked third and Pungo fourth.

The color of the chips fried shortly after harvest ranged from 81 to 90 with a mean of 88.

Three replicated yield tests of recent selections were conducted in an isolated area. The total number of seedling varieties in these 3 tests including checks was 85. These were grown in 4 complete blocks and randomized within the block. The individual plots were single 25-hill rows, the plants one foot apart in the rows and the rows 3 feet apart. Red Dot 20, a variety that usually yields as much as Kennebec was planted as a check in each of the 3 tests.

Red Dot 20 on an average for the 3 tests yielded 424 cwt. per acre. None of the seedling varieties significantly exceeded Red Dot 20 in yield but 19 of them were in the same class.

In percentage solids Red Dot 20 is usually below average. The 85 seedlings tested showed a wide range in this character from 16.2% to 21.4%. Forty-one of the seedlings in the test were significantly higher in percentage solids than the check.

The chip color made from 85 varieties in these tests, fried shortly after arrival in Madison ranged from 80 to 90 or in other words the color of the chips made from the tubers of all of the 85 selections shortly after harvest was commercially acceptable.

Samples of all replications of all these varieties are now in the 4 controlled temperature rooms at 50°, 45°, 42°, and 38°.

Yield Tests (Selections from Inheritance Studies)

In 1960, 48 selections made from the studies, on inheritance of chip color and other characters, being made by the junior author of this report were grown in two replicated trials, 24 in each test. Kennebec was included as a check.

The varieties were planted in 4 complete randomized blocks, in single 25-hill rows, the plants 1 foot apart in the row and the rows 3 feet apart. The Kennebec checks averaged 414 cwt. per acre. None of the 48 seedling varieties outyielded Kennebec but 21 of them were in the same class in yield. In percentage solids 7 seedlings were significantly higher in percentage solids than Kennebec and 21 were in the same class. Kennebec averaged 18.6% solids.

The color of the chips made from Kennebec fried shortly after harvest scored 84 for the average of both tests. The color of the chips made from the 48 seedlings ranged from 77 to 90 with a mean of 85. Fifteen of the varieties produced chips that were significantly higher in chip color than those made from Kennebec.

Yield Test (Selections from Storage Tests)

In 1960, 33 seedling varieties, 13 of which have Red Dot variety numbers were tested in a replicated yield trial. Chips made from most of these varieties had commercially acceptable color when fried direct from 50° F. storage, some of them with 4 weeks curing after 42° storage and in 1959 the chips of several of them scored 80 or higher with 4 weeks curing after storage at 38°. The design of this test was the same as that described for the immediately preceding yield tests in this report. Kennebec was included as a check.

The data on maturity and yield indicated that the 1960 season favored late varieties. Kennebec yielded 458 cwt. of potatoes per acre. Four seedling varieties outyielded Kennebec but not significantly. Kennebec and these 4 varieties were all late maturing. Six Red Dot varieties and 3 numbered seedlings, all of which were medium in maturity, yielded more than 300 cwt. per acre, but only 2 early varieties yielded more than that amount.

The percentage solids ranged from 16.6 to 20.2 with a mean of 18.3. Kennebec with a percentage solids of 18.8 was slightly above the average. Seven varieties were significantly higher than Kennebec, 11 others were in the same class and 15 were lower in dry matter content than the check variety. The chips made directly after harvest from the 34 varieties ranged in color from 79 to 90 with a mean of 86. The color of the chips from Kennebec scored 83. There were significant statistical differences among the chips made from different varieties but the color of the chips made from all but one of the varieties was commercially acceptable judged by Red Dot standards which are higher than those of some other companies.

Samples of all replications of the varieties in this test are stored in the controlled temperature rooms. Specific gravity and color of chips will be determined later this winter and spring.

In 1960, 41 varieties were planted in the replicated yield test in Alabama. They were planted in 6 complete blocks and randomized within the block. Each plot consisted of two 20-hill rows. The plants were one foot apart in the rows and the rows were 3 feet apart. The plots were planted February 2. Three blocks were harvested May 17, the other three on June 15. Russet Sebago was planted as a check.

The stand was irregular. Only 16 varieties produced a stand of 90% or higher.

Because of the irregular stand the yield data were not analyzed in the usual way. The average yield per plant was determined and the yield per plant of each variety was compared with that of Russet Sebago on a percentage basis. On May 17, ten varieties; Pungo, Saco, RD 5, RD 46-16, B 4085-19, B 4097-22, B 4277-2, B 4277-3, ND 4317-3 and ND 4423 LB-19 outyielded Russet Sebago. On June 15, Saco, RD 20, RD 26-16, RD 46-16, B 4277-3, ND 4317-3, ND 4423 LB-19 and Far 112-3 were higher in yield per plant than Russet Sebago.

In 1960 the percentage solids of all 41 varieties were higher at the time of the late harvest June 15, than they were on May 17. This was contrary to the results obtained in 1959 when the percentage solids for 22 varieties harvested June 17 was lower on the average than was found in the tubers of the same varieties harvested May 26. On May, 1960, the varieties ranged in percentage solids from 15.0 to 19.1 with a mean of 17.2. On June 15 the percentages ranged from 17.3 to 21.4 with a mean of 19.1, an increase of 10% on a dry matter basis. On May 17, 25 varieties were significantly higher in percentage solids than Russet Sebago but on June 15 only 4 were higher than the check variety in dry matter content.

The chip color of the 41 varieties harvested May 17 ranged from 72 to 87 with a mean of 81. The chip color of the same varieties harvested June 15 was much higher ranging from 78 to 89 with a mean of 85.

Both the color of chips and the solids improved in the interim between the two harvests.

Observation Plots

In 1960, 310 varieties were planted in 5-hill rows for observation. Data on vigor of vine, plant stand, potential yield, size of tubers, percentage solids, and chip color were obtained on 306 of these.

For vigor about 18% were above the average, 50 percent average and 32% below average.

More than 85% of the varieties produced perfect stands, most of the others produced 4 plants per row.

In potential yield about 14% were above average, 41% average and 45% below average.

For size of tubers 13% of the varieties produced medium to large tubers, 33% medium, 10% small to medium and 44% small.

Percentage solids of 306 varieties ranged from 13.5 to 22.9 with a mean of 18.4. Fifty-four varieties ranged in percentage solids from 20.1 to 22.9 with a mean of 20.8. These percentages are exceptionally high for Alabama indicating progress in that direction.

Chip color ranged from 75 to 90 with a mean of 86.

Twenty-four of the varieties under observation excelled in all 5 criteria; vigor, potential yield, size of tubers, percentage solids and chip color. Most of these will be grown in replicated plots in Alabama in 1961.

Chip Color

Chips with satisfactory color can be made from many varieties of potatoes direct from the harvest field provided they are handled properly and not harvested directly after a heavy freeze and while the weather is still cold. Since this is true the major emphasis of the research program is given to chip color in relation to storage.

Red Dot buys about 60% of its yearly supplies of potatoes from various sections of the country, some as far away as California. The rapidly rising transportation charges, the damage often done to potatoes in transit and the usual high cost of new potatoes in early spring are incentives for Red Dot to grow and store a larger percentage of its yearly requirements. In preparation for such a development two large modern storehouses were built recently, one in Rhinelander and the other at Waupaca; to augment the storage capacity of the facilities that were already in use.

With the prospect of storing potatoes for many months after fall harvest, the effects of storage temperatures on color of chips and rapidity of reconditioning after removal from storage are of major importance.

In 1959 three controlled temperature rooms were available for our work. These were held at 50° F., 42° F. and 38° F. In 1960 another room was built which is held at 45° F. In 1960 samples from the 602 selections from the seedlings grown the second year in the field are being held at 50° and 42° and samples from all replications of approximately 200 varieties in the yield tests and from the increase plots are in 50°, 45°, 42° and 38°. After 3 to 5 months in storage the specific gravity of the potatoes and color of chips made from all these samples after various times of curing will be determined.

The results of the 1960 tests will not be available for several months but some very interesting data were obtained in 1959 after the annual report was sent to Beltsville.

Storage 50° F. - In 1959 tuber samples of all the late harvested yield tests and the selections from the 10-hill rows grown at Rhinelander were stored from 9 to 16 weeks at 50° and chipped direct from storage. From a total of 675 varieties tested 220 or about 33% produced chips with a color score of 80 or higher, colors that are commercially acceptable. It is evident that it is not difficult to produce varieties that will produce chips with acceptable color stored at 50° and chipped direct from storage. Storage, 42° F., 4 to 5 Weeks Curing - It often takes 8 to 9 weeks at a room temperature of 70° to 80° to recondition the tubers of the standard varieties, but chips with excellent color can be made from the tubers of some of the new seedling varieties after curing 4 weeks.

In 1959 out of 741 varieties tested chips with color indexes 80 or higher were made from 211 or about 28% of them. It is obvious that it is not difficult to breed varieties the tubers of which can be stored from 9 to 12 weeks at 42° F. and produce good to excellent colored chips after 4 weeks curing at 70° to 80°.

Increase of Brown Color and Rapidity of Curing After 42° F. Storage--In 1959 tuber samples of 62 high yielding seedling varieties were stored at 42°. Chips were made from the tubers the day they were stored and every week in storage for 5 weeks. Other tuber samples of the same varieties were stored for 9 weeks, chipped on removal from storage and at weekly intervals for 4 weeks after transfer to the curing room. The object of these tests was twofold; to determine the increase in browning of the chips from each variety as related to the time in storage and to ascertain the time required for the tubers of each variety to condition after 9 weeks in storage.

The chips made from 47 varieties scored 80 or higher before they were placed in 42° storage. After 1, 2, 3, 4, 5 and 9 weeks storage chips with indexes of 80 or higher were made from 17, 5, 4, 1, 0 and 0 varieties respectively. After storing 9 weeks and curing 1 week the chips made from all varieties were still below 80 in color. After 2 weeks in the curing room the chips from 7 varieties scored 80 or higher. After 3 weeks this number had increased from 7 to 16 and in 4 weeks to 19. Although varieties that require only 4 weeks curing would have several advantages over those that require 8 or 9 weeks, the indications are that a few varieties will recondition in 3 or even 2 weeks time after 9 weeks storage at 42° F.

Conditioning after storage at 38° F. -- If potatoes are to be stored over winter and well into the summer months a storage temperature lower than 42° is desirable. Tuber samples of the same 62 varieties that were stored at 42° were stored also at 38°. After about 18 weeks in 38° the potatoes were transferred to the curing room. Samples were chipped on removal from storage and at weekly intervals for 7 weeks thereafter. The data for these tests are given in Red Dot table 1.

The chips made from the tubers direct from storage were very dark in color ranging from 52 to 60 with an average of 58. Some of the varieties scored 77 after one week and 78 the second week. After 3 weeks the chips made from 6 varieties scored 80 or higher in color, after 4 weeks the number of varieties in this class had increased to 9, in 5 weeks to 15, in 6 weeks to 27 and in 7 weeks to 28. The other 34 varieties were not reconditioned after 7 weeks curing in a temperature of 70° to 80°.

Reconditioning of Red Dot Numbers after storage at 38° F. -- Twenty-eight seedling varieties that were given Red Dot numbers were stored at 38° F. for about 14 weeks after which they were transferred to the curing room. Samples of each were chipped on removal from storage and at weekly intervals for 7 weeks.

The data for these tests are given in Red Dot table 2.

The chips made from the tubers direct from storage were very dark. They ranged in color from 51 to 61 with a mean of 57. In one week the chips of Red Dot 10 scored 78, a color acceptable on some markets. In two weeks the chips made from Red Dot 10 scored 79. At this time Red Dot 7 and Red Dot 17 scored 81 and 80 respectively. In 3 weeks the number of varieties from which chips with indexes of 80 or higher had increased to 6, in 4 weeks to 13, in 5 weeks to 13 in 6 weeks to 20 and in 7 weeks the number was still 20. The best Red Dot varieties in this group so far as speed of reconditioning is concerned were; 7, 8, 9, 10, 15 and 23. The tubers of Kennebec cured slowly. The best chips made from this variety scored 75 after 7 weeks in the curing room.

Red Dot table 1. Chip color^{1/} of 62 advanced seedling varieties held in 38° F. storage for 18 weeks, cured in 70° to 80° and chipped at weekly intervals, 1959.

Time Stored Weeks	Time Cured Weeks	Varieties Tested No.	Chip Color Range	Index Mean	Varieties with Index 80 ^{2/} or higher No.	Pct.
18	0	62	52-60	58	0	0
18	1	62	61-77	67	0	0
18	2	62	65-78	70	0	0
18	3	62	62-89	74	6	10
18	4	62	66-84	75	9	15
18	5	62	66-88	76	15	24
18	6	62	70-88	79	27	44
18	7	62	71-89	79	28	45

1/ The Red Dot scale for chip color runs from 50 to 90. In all the tests 90 is the top limit for chip color.

2/ Chips with a color 80 or higher are commercially acceptable.

Red Dot table 2. Chip color^{1/} of 28 Red Dot varieties and a Kennebec check after storing at 38° F. for about 14 weeks, chipping direct from storage and from the 70° to 80° curing room at weekly intervals for 7 weeks, 1959.

Red Dot No.	Arr. Color Index	1 Wk. Color Index	2 Wk. Color Index	3 Wk. Color Index	4 Wk. Color Index	5 Wk. Color Index	6 Wk. Color Index	7 Wk. Color Index
1	58	64	62	71	66	70	81	74
2	56	61	66	73	76	78	82	78
3	55	61	65	72	69	75	77	75
4	57	67	72	77	80	86	86	80
5	56	65	71	73	75	75	77	80
66	56	67	69	72	76	73	77	80
7	59	68	81	81	88	83	86	84

continued

Red Dot table 2, continued.

8	61	68	77	82	82	87	83	89
9	57	73	74	81	87	83	88	86
10	57	78	79	84	86	84	88	84
11	56	65	74	79	80	77	81	81
12	58	69	75	78	81	82	81	85
13	57	65	71	76	74	73	79	71
14	53	73	71	75	76	83	79	84
15	51	67	76	80	86	88	89	87
16	58	69	76	78	81	80	84	83
17	57	72	80	77	79	83	86	85
18	58	70	76	77	77	79	83	76
19	56	68	69	76	71	76	79	79
20	55	70	75	79	76	79	84	81
21	57	68	71	76	80	80	86	84
22	57	71	76	75	69	77	76	80
23	56	77	78	88	88	87	87	86
24	57	66	75	76	78	74	84	77
25	58	72	74	78	81	78	78	82
26	57	71	77	77	77	79	80	79
27	59	74	79	79	86	87	84	84
28	56	64	69	72	78	75	79	79
Kennebec	56	63	67	65	70	70	69	75
Mean	57	68	73	77	78	79	82	81
No. of varieties with index ^{1/}								
80 or higher	0	0	2	6	13	13	20	20

^{1/} The Red Dot scale for chip color runs from 50 to 90. In all tests 90 is the top chip color. Chips with an index 80 or higher are commercially acceptable.

WYOMING
William A. Riedl

The potato breeding work in Wyoming in 1960 consisted primarily of breeding for resistance to scab and ring rot, high yield of desirable type tubers and high percentage of solids.

One-hundred and thirty-six selections were grown in rows 15 ft. long and 126 selections were grown in rows 40 ft. long. These were tested for yield, scab resistance, tuber type, maturity and for percentage of solids. Only the best were saved for further testing.

Four replicated yield trials were conducted in three locations in the State. Wyoming table 1 shows the results of the variety yield trial at Laramie which contained 18 varieties, planted in one-row plots 40 ft. long and replicated four times. Wyoming table 2 gives the results of 17 promising seedlings and the Bliss Triumph variety which were planted in one-row plots, 40 ft. long and replicated four times.

The Torrington yield trial (Wyoming table 3) contained nine varieties and nine promising seedlings, planted in rows 35 ft. long with four replications. Two of the seedlings were rogued out during growing seasons because of poor stand and disease.

Wyoming table 4 shows the results of the yield trial at Powell which contained seven varieties and five promising seedlings planted in rows 30 ft. long and replicated four times.

Twenty-three promising seedlings were increased at Laramie and eighteen were increased at Torrington.

Wyoming table 1. Potato variety trial, Laramie, Wyoming, 1960.

Variety	Total Per Acre	U.S.No.1 Per Acre ^{1/}	Rank of U.S.No.1	U.S. No.1	Stand	Total solids
	Cwt.	Cwt.		Pct.	Pct.	Pct.
Red Pontiac	231	195*	2	84	87	19.2
LaSoda	224*	196	1	87	85	21.2
Satapa	222*	190*	3	86	86	19.2
Yampa	202	171*	4	85	80	22.2
DeSoto	201	158	6	79	89	19.7
Kennebec	198	165	5	83	87	20.9
W 2598	187	157	7	84	83	20.9
Norland	185	151	8	82	96	19.4
Teton	182	141	9	77	87	20.7
Cayuga	177	121	14	68	93	21.8
Early Gem	176	141	9	80	93	19.2
Redglo	173	133	12	77	84	19.4
Redbake	172	137	11	80	92	21.8
Red McClure	168	115	16	68	81	22.7

continued

Wyoming table 1, continued.

Progress	166	116	15	70	79	19.2
Bliss Triumph	160	130	13	81	81	19.7
Sheridan	153	115	16	75	83	20.1
Russet Burbank	122	75	18	61	76	20.7
General Mean	183	145		78	86	20.4
L.S.D. 5% Level	28	30				

1/ Two inch minimum

* Statistically equal to highest yield at 5% level

Previous crop, corn for silage; date planted May 24; planted in one-row plots 40 feet long, with 4 replications; rows spaced 3 feet apart, with hills spaced one foot apart in the row; irrigated June 27, July 21, August 2 and 15; dusted with sulphur and 5% DDT - July 2, 26, and August 13; date of frosts June 20, August 17, killing frost August 24; harvested September 28.

Wyoming table 2. Potato seedling trial, Laramie, Wyoming, 1960.

Seedling Number	Total Per Acre	U.S.No.1 Per Acre ^{1/}	Rank of U.S.No.1	U.S. No.1	Stand	Total solids
	Cwt.	Cwt.		Pct.	Pct.	Pct.
W 2835	232	200	1	86	91	20.7
W 2854	221*	188*	3	85	64	22.7
W 2746	218*	192*	2	88	81	21.4
W 2938	215*	178*	4	83	82	21.4
W 2578	209*	163	6	78	94	20.7
W 2809	193	171*	5	89	91	20.9
W 2803	189	158	7	84	83	20.5
W 2804	185	142	10	77	98	23.3
W 2550	182	150	9	83	77	21.6
W 2650	177	154	8	87	79	20.1
W 2787	170	133	11	78	85	20.7
Bliss Triumph	166	128	15	77	88	19.7
W 2548	159	132	12	83	73	--
W 2939	159	129	14	81	83	20.9
W 1122	157	130	13	83	83	20.7
W 2549	132	105	16	80	68	21.8
W 2807	115	95	16	83	59	--
General Mean	180	150		83	81	21.1
L.S.D. (5% level)	31	30				

1/ Two inch minimum

* Statistically equal to the highest yield at the 5% level. Previous crop, corn for silage; date planted, May 24; planted in one-row plots 40 feet long, with 4 replications; rows spaced 3 feet apart, with hills spaced one foot apart in the row; irrigated June 27, July 21, August 2 and 15; dusted with sulphur and 5% DDT - July 2, 26, and August 13; harvested September 28.

Wyoming table 3. Potato variety trial, Torrington Substation, 1960.

Variety or Seedling	Total Per Acre	U.S.No.1 Per Acre ^{1/}	Rank of U.S.No.1	U.S. No.1	Stand	Total solids
	Cwt.	Cwt.		Pct.	Pct.	Pct.
LaSoda	323	230*	2	71	84	19.0
Red Pontiac	322*	199	7	62	85	18.8
W 2803	317*	225*	3	71	77	19.7
Norland	294*	249	1	85	89	20.1
W 2578	268	208*	5	78	73	19.0
Redglo	260	222*	4	85	98	19.0
Teton	254	188	8	74	71	19.2
Redbake	249	202	6	81	81	21.2
Kennebec	221	160	10	72	81	18.6
Bliss Triumph	218	142	12	65	89	19.7
Sheridan	194	175	9	90	59	20.9
W 2792	188	142	12	76	79	19.2
W 2598	177	152	11	86	54	19.0
W 2758	174	88	16	51	70	18.8
W 2787	145	89	15	61	54	20.1
W 2549	138	116	14	84	66	20.9
General Mean	233	175		75	76	19.0
L.S.D. 5% Level	49	45				

^{1/} One and one-half inch minimum

* Statistically equal to highest yield at the 5% level.

Previous crop, alfalfa; date planted, June 2; planted in one-row plots 35 feet long with 4 replications; rows spaced 3 feet apart with hills one foot apart in the row; irrigated, 7 times; dusted with sulphur and 5% DDT dust July 6 and 25; harvested September 26.

Wyoming table 4. Potato variety trial, Powell Substation, 1960.

Variety or Seedling	Total Per Acre	U.S.No.1 Per Acre	Rank of U.S.No.1
	Cwt.	Cwt.	
W 2650	329	236*	6
LaSoda	316*	295	1
Red Pontiac	312*	276*	2
Bliss Triumph	284*	255*	3
W 2803	280*	248*	4
W 2578	269*	247*	5
Teton	265*	231*	8
W 1122	264*	235*	7
Kennebec	212	173	10
Red McClure	209	172	11
W 2598	196	179	9
Russet Burbank	154	115	12
General Mean	257	222	
L.S.D. 5% Level	70	67	

* Statistically equal to highest yield at the 5% level. Previous crop, alfalfa; date planted, May 16; planted in one-row plots, 30 feet long with 4 replications; rows spaced 3 feet apart, with hills one foot apart in the row; harvested Sept.22.

